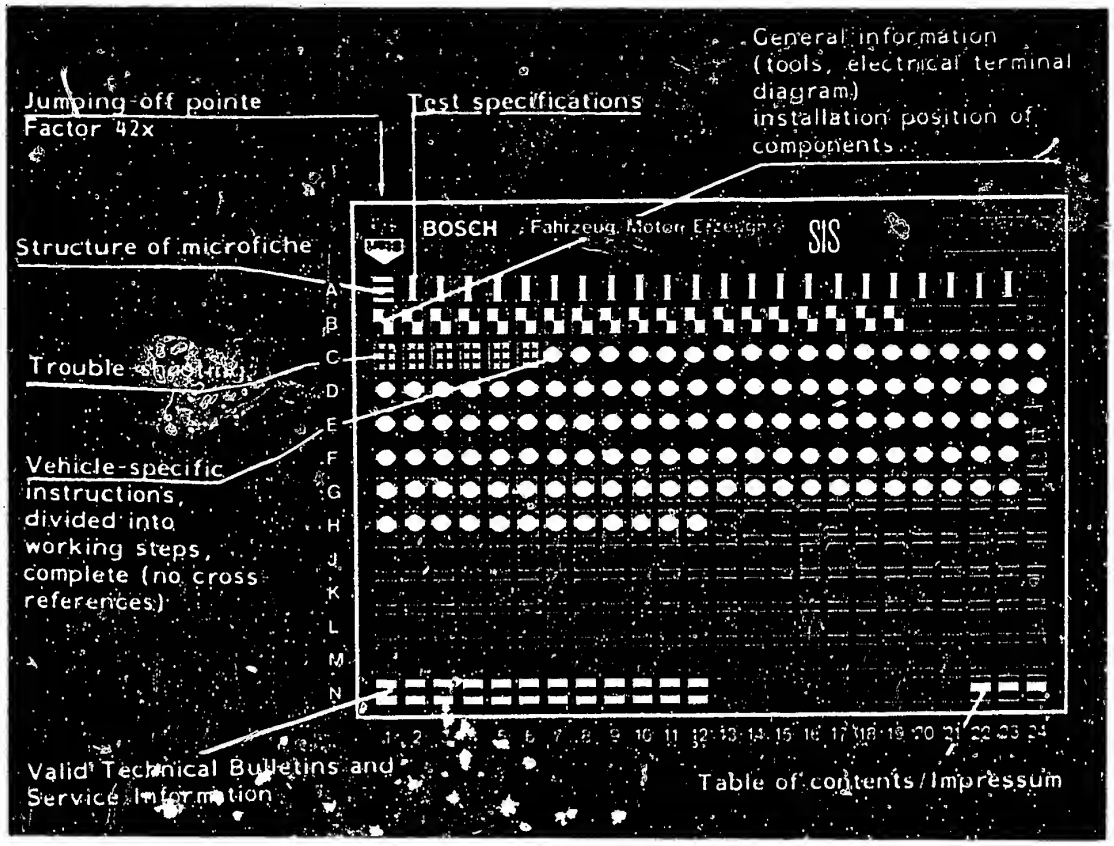
Structure of microfiche



1. Read from left to right

2. Title of microfiche (appears on each coordinate)

E16	Product/component/test step
	Vehicle/engine

Coordinate

3. Limits of section

Beginning | Mid-section | End | One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar.

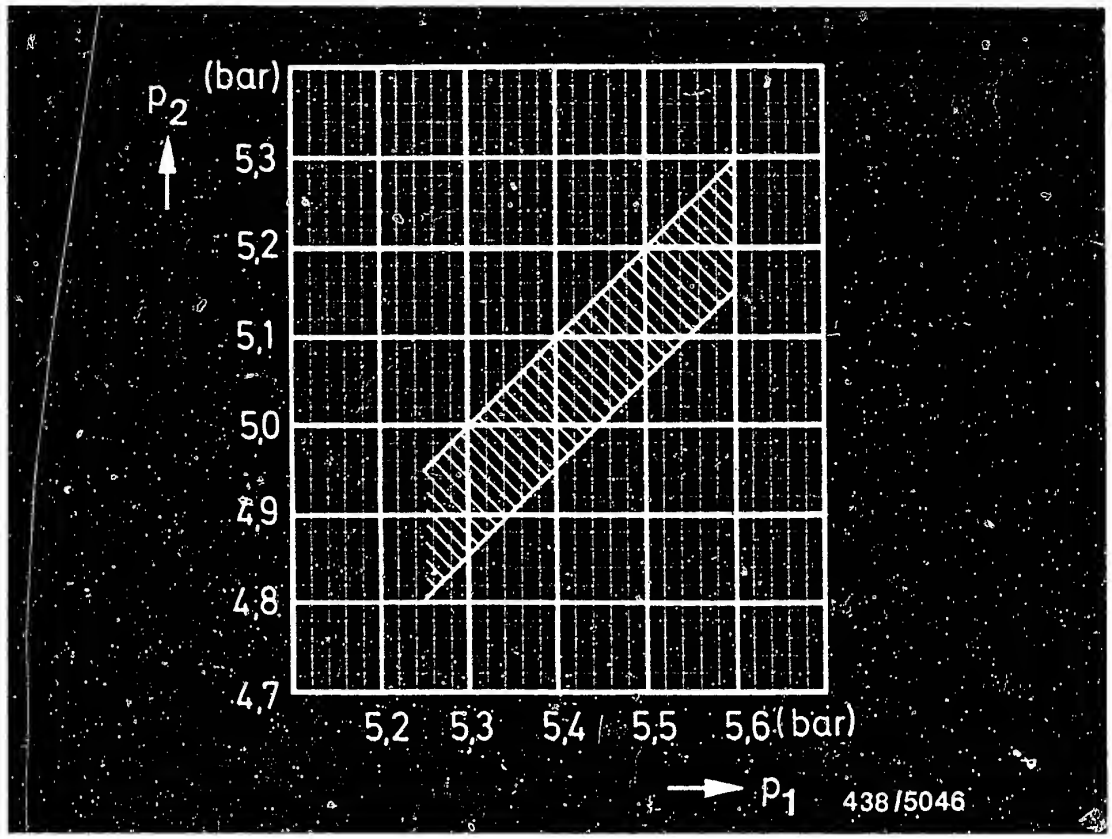
5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

C6

1. Test specifications

Test step	Test specifications*
C21	
1.1 Electric fuel pump:	
Fuel delivery:	min. 1100 cm^3/min.
D3	
1.2 Fuel pressures:	
Primary pressure	5.25 ... 5.6 bar (5.35 ... 5.7 kgf/cm^2)

* Pressures indicated in test specifications in bar (gauge pressure) or in kgf/cm^2 (gauge pressure)

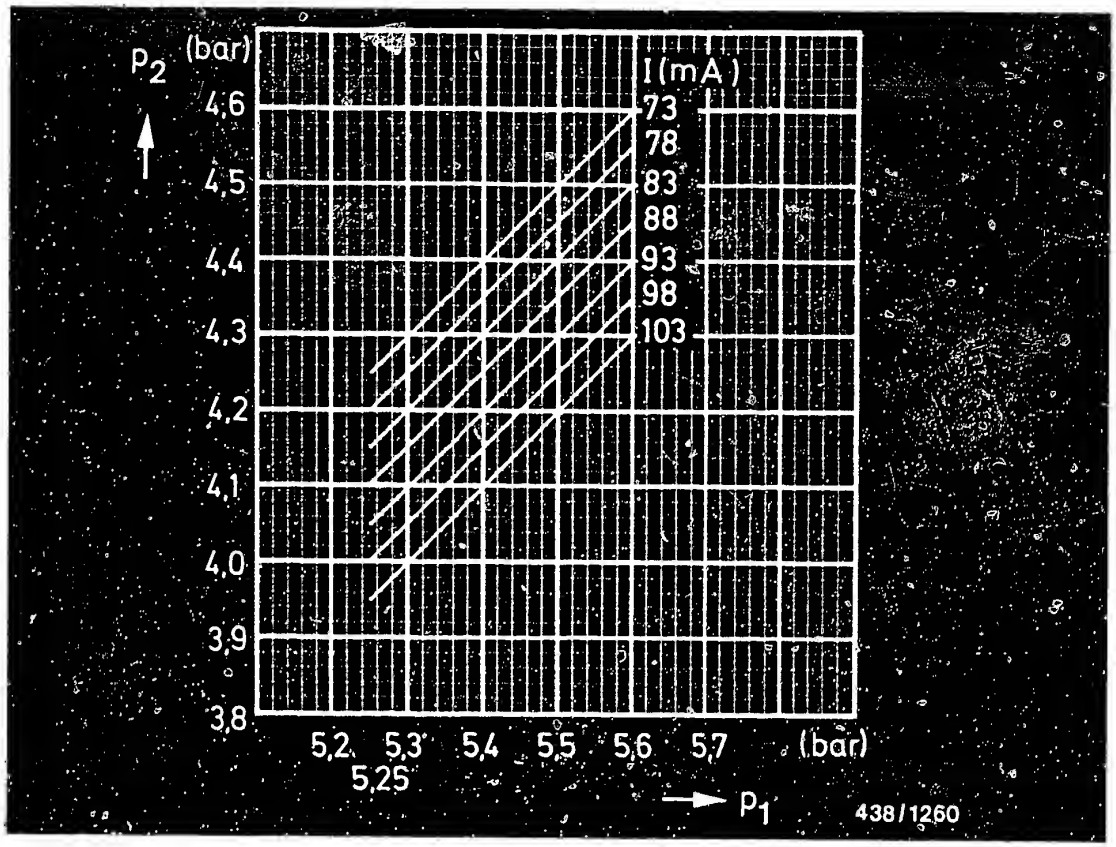


p_1 = Primary pressure
p_2 = Lower-chamber pressure, actuator current = 8 mA

D3

Differential pressure:
(Primary pressure/lower chamber pressure)

Obtain the lower chamber pressure set value "warm" from the graph corresponding to the primary pressure as measured.



p_1 = Primary pressure

p_2 = Lower chamber pressure "cold". tolerance $\pm$ 0.15 bar

I = Actuator current

D3

Obtain the lower chamber pressure set value "cold" from the graph corresponding to the primary pressure as measured and the actuator current as measured.

The "cold" condition is simulated by disconnecting the plug on the temperature sensor (NTC).

Test step	Test specifications*

D3

1.3 Test for leaks on the fuel system as a whole:

Minimum pressure	
after 10 min.:	2.7 bar (2.8 kgf/cm²)
after 20 min.:	2.6 bar (2.7 kgf/cm²)

E3

1.4 Injection valve:

Opening pressure	3.0 ... 4.1 bar (3.1 ... 4.2 kgf/cm²)

E11

1.5 Fuel distributor test:
(Testing done with pressure actuator attached, actuator current 8 mA).

Comparative measurement of fuel deliveries at outlets:	Setting point	Max. allowable delivery
Idle:	6.0 cm³/min	6.6 cm³/min
Part load:	40.0 cm³/min	42.5 cm³/min
Full load:	100.0 cm³/min	109.0 cm³/min
Full load with maximum deflection of the air-flow sensor plate. Minimum delivery from all outlets:	140.0 cm³/min	---

*Pressures indicated in test specifications in bar (gauge pressure) or in kgf/cm² (gauge pressure).

Test step	Test specifications*

F4

1.6 Temperature sensor
Measurements of resistance:

Engine cold. Ambient temperature (+15°C...+30°C):	1300 ... 3600 Ω
Engine at normal operating temperature (approx. +80°C):	250 ... 390 Ω

C23

1.7 Thermo-time switch
Measurements of resistance:

At a temperature:	Measurements of resistance between Terminal "G" and ground (housing)	Terminal "W" and ground (housing)	Terminal "G" and Terminal "W"
Below 0°C	75...110 Ω	0 Ω	75...110 Ω
Above + 10°C	75...110 Ω	∞ Ω	∞ Ω

F4

1.8 Air-flow sensor potentiometer:
Voltage signal with the air-flow sensor plate in its basic position: 0.2 ... 0.3 V

1.9 Idle adjustment: *

Idle speed:	
Value set by idle speed control	= 720 ± 50 min^{-1}
On/off ratio to be set	= 28 ± 1%
Exhaust gas setting:	
Checking the integrator voltage.	
Checking value	= 2.1 ... 4.8 V
Setting value	= Open-loop control value ± 0.8V

* Notes on idle adjustment:

Checking and setting of idle using the lambda closed-loop tester KDJE-P 600.

The idle speed control automatically controls the idle speed, but the on/off ratio is to be checked at idle speed and, if need be, corrected by making adjustment on the idle actuator bypass screw.

The exhaust gas setting is done automatically by the lambda closed-loop control, but the integrator voltage is to be checked at idle and, if need be, corrected by making adjustments on the idle-mixture-adjusting screw in the mixture-control unit.

To do this, disconnect the lead for the lambda sensor at idle and determine the steady-state open-loop control value (approx. 3 V). Then connect the sensor lead. Closed-loop control operation can be identified from the pulsing movement of the needle on the voltmeter.

If the control is within the maximum test specification (2.1...4.8 V), no readjustment is required. If the control range lies beyond the limits, make an adjustment. In so doing, set the average value at the open-loop control value determined previously (approx. 3 V). Maximum fluctuation = $\pm$ 0.8 V.

2. Rapid diagnosis chart for the universal test adapter ETT 018.01 using the KE-Jetronic test lead 1 684 463 135 and a suitable multimeter:

Using the rapid diagnosis chart below, the experienced Jetronic technician can check swiftly the electric/ electronic peripheral and control unit functions of the KE-Jetronic, including the lambda closed-loop control and the idle speed control.

If detailed information on trouble-shooting and on test procedures is required, proceed basically in accordance with the trouble-shooting chart (Coordinates C1 - C6).

Important note on the rapid diagnosis chart below:

The column "Test conditions" shows those test depths for which the control unit plug must be connected or disconnected. Make absolutely certain that the ignition is off whenever connecting or disconnecting this plug.

Rapid diagnosis chart for the universal test adapter ETT 018.01

Test step	Switch position V	Switch position Ω	Button	Object being tested	Test connections	Test conditions	Test specifications (reading)	For trouble-shooting see
1	↓	4	-	Internal resistance of pressure actuator	12 - 10	Disconnect control unit plug.	21...25Ω	F 4
2	↓	5	-	Internal resistance of temperature sensor +15°C...+30°C; approx. +80°C:	21 - 2	Control unit plug disconnected.	 1.3..3.6kΩ 250...390kΩ	F 4
3	↓	11	-	Ground, control unit output stage	20 - 2	Control unit plug disconnected.	0 ... 10Ω	F 4
4	↓	9		"Idle" throttle valve switch	13 - 2	N.B.: Measurement of voltage; connections for voltmeter: Negative = Black socket "V" Positive = Blue socket on left "Ω" Control unit plug disconnected. Turn on ignition. Throttle valve closed: Open throttle valve by hand:	 8 ... 15V 0V	 F 4
5	↓	10	-	"Full load" throttle valve switch	5 - 2	N.B.: Measurement of voltage; connections for the voltmeter: Negative = Black socket "V" Positive = Blue socket on left "Ω" Control unit plug disconnected. Turn on ignition. Throttle valve closed: Throttle valve fully opened:	 0V 8 ... 15V	 F 4

Rapid diagnosis chart for the universal test adapter ETT 018.01 (continued)

Test step	Switch position V	Switch position Ω	Button	Object being tested	Test connections	Test conditions	Test specifications (reading)	For trouble-shooting see
6	3	-	-	Starting signal terminal 50 - ignition lock (only for vehicles with automatic transmission)	16 - 2	Voltmeter conditions normal; "V" sockets black, red. Control unit plug disconnected. Turn on starting motor:	8...15 V	F 4
7	4	-	-	Starting signal terminal 50 - Starting motor	24 - 2	Control unit plug disconnected. Turn on starting motor:	8...15 V	F 4
8	5	-	-	TD signal (ignition)	25 - 2	Control unit plug disconnected. Turn on starting motor for a few seconds:	Value for voltage undefined.	F 4
9	6	-	-	Control unit-power supply	1 - 2	Control unit plug disconnected. Turn on ignition:	8...15 V	F 4
10	7	-	-	Power supply to potentiometer on air-flow sensor and to pressure sensor (altitude sensor)	18 - 2	Connect control unit. Turn on ignition:	7...8 V	F 4
11	8	-	-	Signal-potentiometer on air-flow sensor	17 - 2	Control unit connected. Turn on ignition. Deflect air-flow sensor plate by hand, thereby increasing the voltage up to a max. of 8 V.	0...8 V	F 4

Rapid diagnosis chart for the universal test adapter ETT 018.01 (continued)

Test step	Switch position V	Switch position Ω	Button	Object being tested	Test connections	Test conditions	Test specifications (reading)	For trouble-shooting, see
12	10	-	-'	Idle actuator-power supply and continuity coil 1	3 - 2	Turn off ignition. Disconnect control unit plug. Turn on ignition:	 8...15 V	F 4
13	11	-	-	Idle actuator-continuity coil 2	4 - 2	Control unit plug disconnected. Turn on ignition:	 8...15 V	F 4
14	12	-	-	Signal, air conditioner	19 - 2	Control unit plug disconnected. Turn on ignition. Turn on air conditioner:	 8...15 V	F 4
15	13	-	-	Signal, altitude sensor	11 - 2	Turn off ignition. Connect control unit. Turn on ignition. Connect vacuum pump to the altitude sensor tailpiece. Wiper voltage dependent on air pressure. Sea level: Drop in voltage when vacuum pump is turned on. At 400 mbar:	 app.6.5V app.1.5V	F 4
16	14	24	-	Lambda closed-loop control Closed-loop control function	23 - 2	Control unit connected. Bridge sockets 1 and 2 on the test adapter. Start the engine and warm it up. Closed-loop control function: Pulsing voltage. Average value:	 app. 3 V	F 4

Rapid diagnosis chart for the universal test adapter ETT 018.01 (continued)

Test step	Switch position V	Switch position Ω	Button	Object being tested	Test connections	Test conditions	Test specifications (reading)	For trouble-shooting see
17	-	-	1	Warm-up enrichment -20°C	12 - 12	Measurement of current! Connections for meter: Negative = Black socket 1 Positive = Black socket 2		
						Connect control unit. Disconnect plug on altitude sensor. Turn on ignition:	 63...83mA	F 4
18	-	-	2	Actuator current corresponding to engine at normal operating temperature	12 - 12	Control unit connected. Plug on altitude sensor disconnected. Turn on ignition:	 7... 9mA	F 4
19	-	-	2/4	Starting enrichment	12 - 12	Control unit connected. Plug on altitude sensor disconnected. Turn on ignition. Continue pressing button 2. Pressing button 4 causes the current to increase - within approx. 1 sec. - to:	 48...68mA	F 4
20	-	-	1/4	Post-start enrichment	12 - 12	Control unit connected. Plug on alititude sensor disconnected. Turn on ignition. Continue pressing button 1: Press button 4. Current increases to: After a short while, this is cut back to: Cut-back takes approx. 90 seconds.	 63...83mA 105... 140 mA 63...83mA	F 4

Rapid diagnosis chart for the universal test adapter ETT 018.01 (continued)

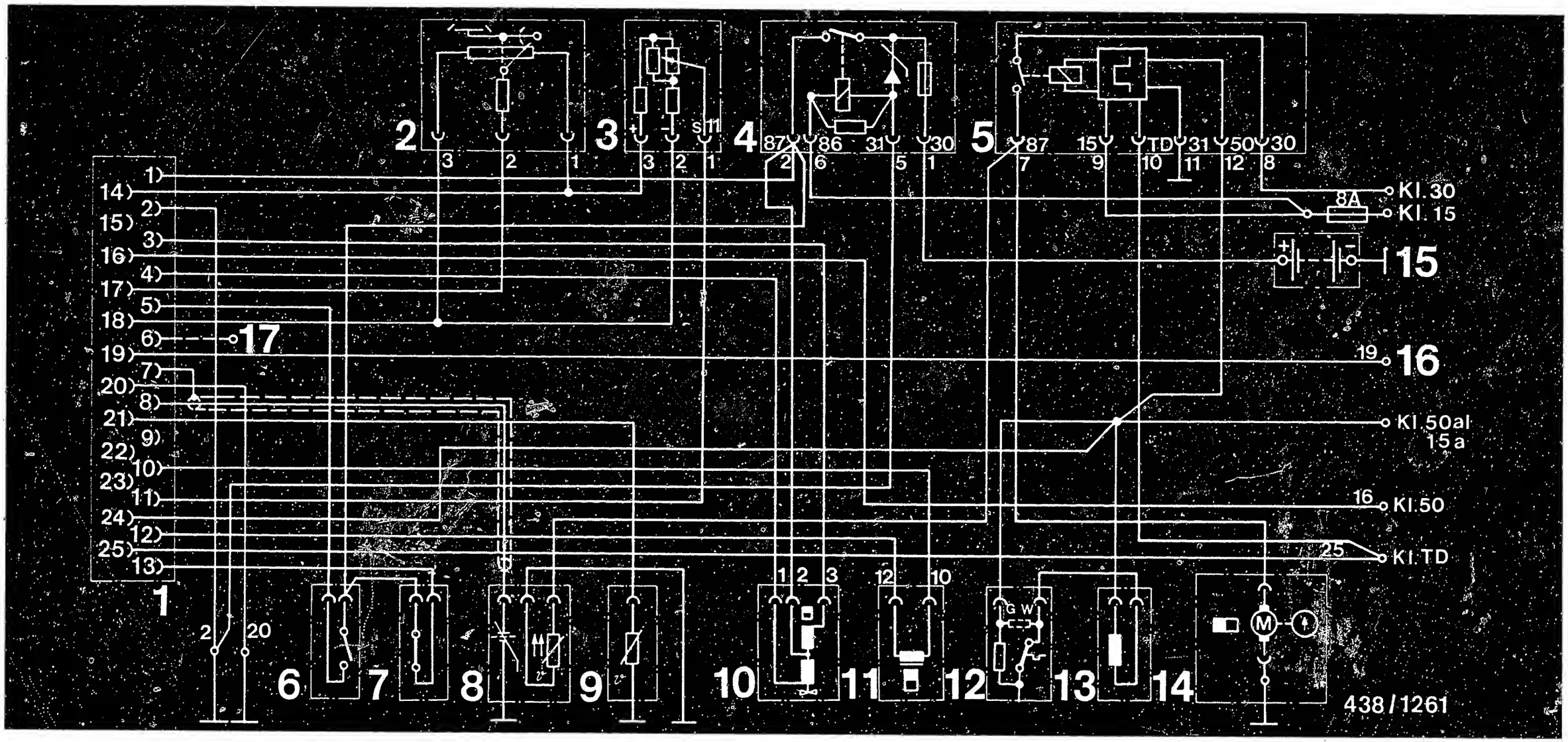
Test step	Switch position V	Switch position Ω	Button	Object being tested	Test connections	Test conditions	Test specifications (reading)	For troubleshooting see
21	-	-	1/6	Acceleration enrichment	12 - 12	Control unit connected. Turn on ignition. Keep both buttons pressed. Current: Quickly deflect the air-flow sensor plate. Current rises to: Cut back within about 1 second to:	 63...83mA 130...150 mA 63...83mA	F 4
22	-	-	2	Overrun cutoff	12 - 12	Control unit connected. Change terminals on ammeter (reverse positive and negative). Start engine and hold at 1800...2000 min^{-1}. While pressing button 2, activate the "Idle" throttle valve switch by hand. Engine hunts. Reading for current during the dropping speed phases: No overrun cutoff is permissible when the cruise control is turned on.	 -40...-50 mA	F 4
23	14	24	-	Lambda closed-loop control	12 - 12 8 - 2	Control unit connected. Start the engine, warm it up, and run it at idle speed. Closed-loop control operation of the lambda control can be identified from the pulsing reading for current. Average value:	 app. 8 mA	F 4

Rapid diagnosis chart for the universal test adapter ETT 018.01 (continued)

Test step	Switch position V	Switch position Ω	Button	Object being tested	Test connections	Test conditions	Test specifications (reading)	For trouble-shooting see
23 (cont'd)	14	24	-	Lambda closed-loop control correction	12 - 12 8 - 2	In operation at full load, the lambda closed-loop control must shift over to open-loop control. For this, remove the power plug of the full load throttle valve switch, and bridge it. Open-loop control value:	7...9 mA	F 4
24	14	22	-	Lambda closed-loop control, rich stop	12 - 12 8 - 2	Control unit connected. Turn on ignition. Current increases to:	max. 16 mA	F 4
25	14	23	-	Lambda closed-loop control, lean stop	12 - 2 8 - 2	Control unit connected. Turn on ignition. Current drops to:	less than 5 mA	F 4

Rapid diagnosis chart for the universal test adapter ETT 018.01 (continued)

Test step	Switch position V	Switch position Ω	Button	Object being tested	Test connections	Test conditions	Test specifications (reading)	For trouble-shooting see
26	10	-	-	Idle speed control		Test using the lambda closed-loop control tester KDJE-P 600. Press button "IR". Bridge black sockets 1 and 2 on the test adapter.		
						Have the engine at normal operating temperature and run it at idle speed. Idle speed (set by regulator):	$720+50 min^{-1}$	
						With on/off ratio:	28 ± 1 %	F 4
						If need be, adjust on/off ratio (bypass screw on the idle actuator)		
				Idle speed control correction functions		Activate idle throttle valve switch by hand. On/off ratio:	33 ± 1 %	
						Put into drive (automatic transmission). Speed drops to:	$620 \pm 50 min^{-1}$	



3. Circuit diagram for the KE-Jetronic with a safety circuit:

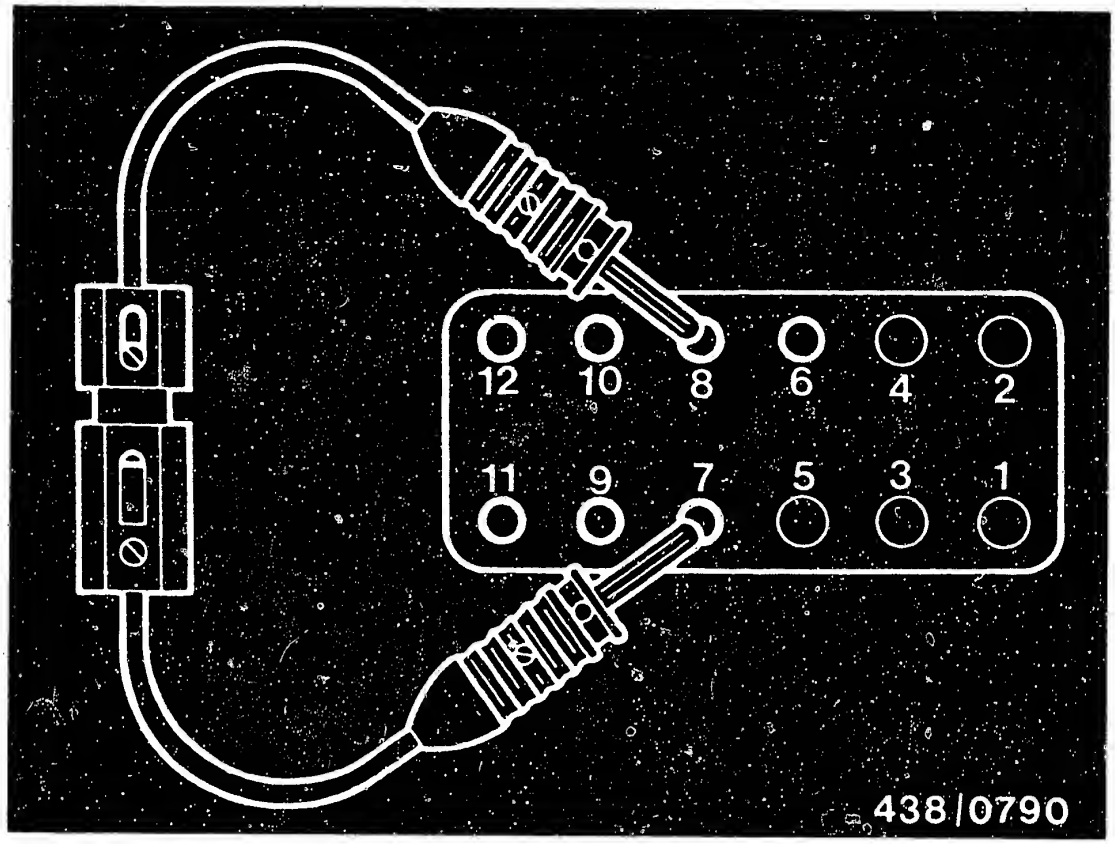
1 = Control unit
2 = Air-flow sensor potentiometer
3 = Pressure sensor (altitude sensor)
4 = Electronic relay with over-voltage protection
5 = Electronic speed relay
6 = Full load throttle valve switch
7 = Idle throttle valve switch
8 = Lambda sensor with sensor heater
9 = Temperature sensor (NTC)
10 = Idle actuator
11 = Pressure actuator
12 = Thermo-time switch
13 = Start valve
14 = Electric fuel pump
15 = Battery
16 = Lead to the air conditioner
17 = Connection for cruise control

3.1 Bridging the electric safety circuit

The electric safety circuit for the electric fuel pump is to be bridged for all pressure and fuel delivery tests.

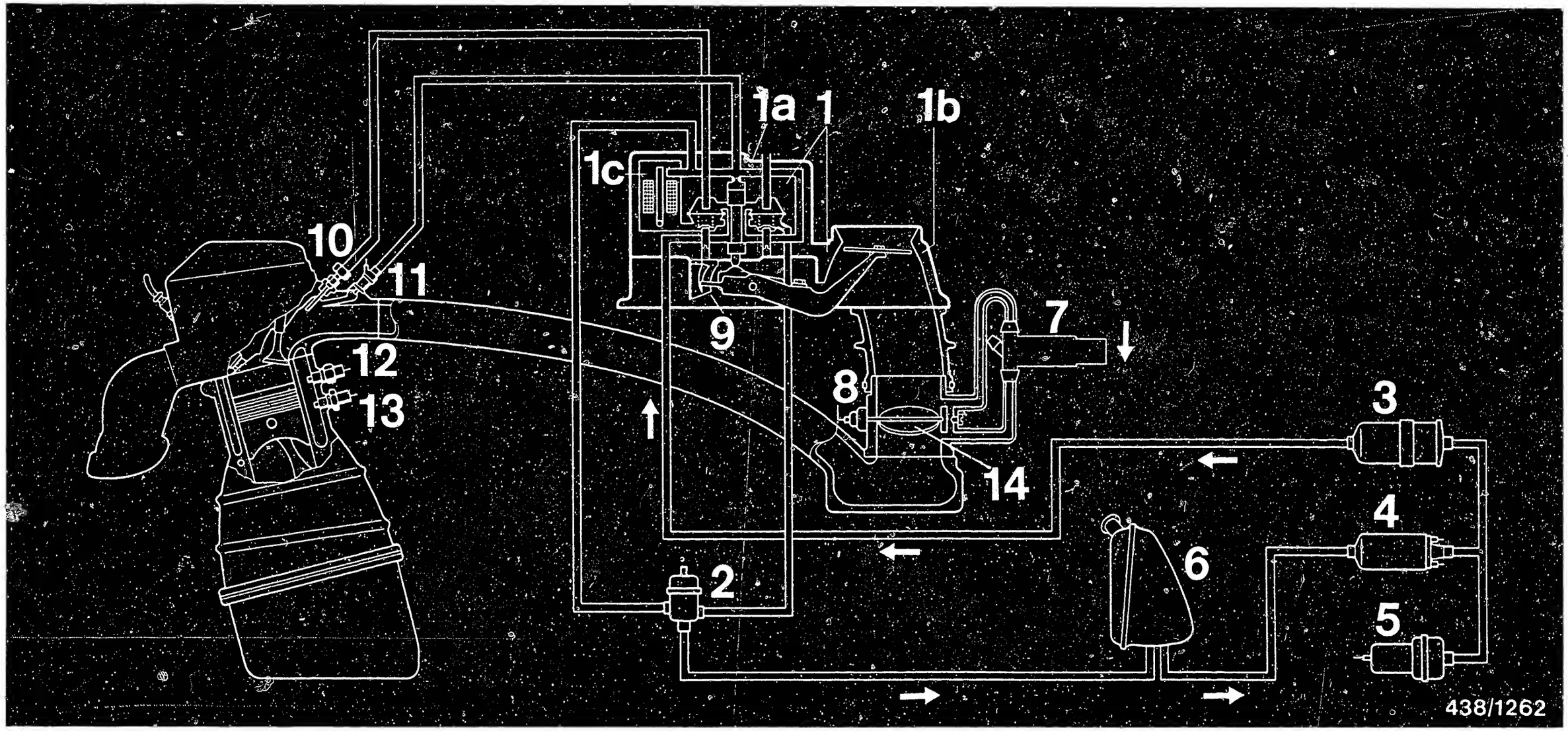
The relays for the safety circuit - the electronic engine speed relay and the electronic over-voltage protection relay with a fuse - are located in the equipment compartment, on the right as viewed in the forward direction of travel, next to the electronic control unit for the KE-Jetronic.

Disconnect the electronic speed relay from the relay base.



Bridge sockets 7 (87) and 8 (30) in the relay base using a connecting cable. Use a 1.5 mm² connecting cable with a fuse holder and a 16 A fuse (user-fabricated as shown in the sketch).

Important note:
Turning on the ignition is sufficient for testing the operation of the control unit. When that is done, one must not bridge the safety circuit. This guarantees that no fuel will be injected if the air-flow sensor plate is moved, which would cause serious damage to the engine in a subsequent start.



4. Diagram of the KE-Jetronic fuel lines

1 = Mixture-control unit
1a = Fuel distributor
1b = Air-flow sensor
1c = Electro-hydraulic pressure actuator
2 = Pressure regulator (primary pressure)
3 = Fuel filter
4 = Electric fuel pump
5 = Fuel accumulator
6 = Fuel tank
7 = Idle actuator
8 = Full load throttle valve switch (idle switch on the linkage)
9 = Air-flow sensor potentiometer
10 = Injection valve
11 = Start valve
12 = Thermo-time switch
13 = Temperature sensor (NTC)
14 = Throttle valve

5. General instructions

5.1 Introduction:

The present microfiche deals with all testing and repair work on the KE-Jetronic in the Daimler-Benz vehicle of Type 190 E / 2.3 USA. All components of the KE-Jetronic have been covered in the individual test sections, along with the pertinent test specifications.

The KE-Jetronic is a further development of the well-known K-Jetronic. In this system, however, all corrections necessary in actual use are directed electronically.
To a large extent, the mechanical-hydraulic basic principle is the same as that of the K-Jetronic, but the separate control pressure circuit, with the control pressure regulator (warm-up regulator), is no longer used.

In order to make it possible to carry out the testing jobs described in this microfiche and to evaluate the components, one should be familiar with the KE-Jetronic and the way it functions. For this, refer to the Technical Instruction, "New Product" VDT-I-438/3, in which its structure and the way in which it works have been described in detail.

For trouble-shooting on the KE-Jetronic, it is assumed that the ignition is in order and that the engine is mechanically perfect.

The structure selected for this microfiche is such that, in addition to these general instructions, lines A and B contain all the information needed by an experienced mechanic for a quick, complete check of the system. This includes the following sections:

- All mechanical, hydraulic, and electrical test specifications.
- A test step chart for the Bosch universal test adapter for testing all electric/electronic functions.
- A listing of the test equipment and special tools needed, and illustration of the installation position for all components.

The test specifications and the chart of test steps contain in each instance the reference to the Coordinates in which each section of the tests is described in detail.

The trouble-shooting chart on Coordinates C1 to C6 will make it easier to determine the test steps that are to be carried out when certain faults are found. Select the possible cause in the trouble-shooting chart appropriate to the complaint from the customer or the problem you yourself have found. The coordinate references at the end of the cause column refer to the corresponding test step, with all the required instructions.

5.2 Important instructions for general work on vehicles with the KE-Jetronic

- Never start the engine without the battery securely connected.
- Never disconnect the battery from the vehicle electrical system while the engine is running.

- When fast-charging the battery, disconnect it from the vehicle electrical system.

- Remove the KE-Jetronic control unit whenever temperatures are above +80°C (paint-drying installations).

- The KE-Jetronic control unit is to be removed during electronic welding jobs (e.g., spot welding).

- Make sure all wiring-harness plugs are seated properly.

- Never connect or disconnect wiring-harness plugs for the control unit while the ignition is turned on.

5.3 Important instructions for work on the KE-Jetronic:

Whenever any fuel connections are taken apart, or parts taken out, including those on the vacuum system, new gaskets are to be used when restoring those connections or parts.

Be extremely neat and clean when working on the KE-Jetronic. Clean fuel connections thoroughly externally before separating them.

During tests with the electric fuel pump running, never deflect (press down) the air-flow sensor plate, because fuel is injected through the injection valves when that is done. This can cause extremely serious damage to the engine in a subsequent start.

5.4 Scope of functions of the KE-Jetronic in the Daimler-Benz 190 E, 2.3 USA

The following are accomplished by means of differential pressure control:

- **Warm-up enrichment:** Enrichment dependent on the engine temperature. Shut-off for the enrichment at approx. + 30°C.
- **Starting enrichment:** Triggered at the start of starting motor operation, regardless of temperature. Enrichment lasts approx. 1 sec.
- **Post-start enrichment:** Triggered at the start of starting motor operation. How much the enrichment is and how long it lasts depend on the temperature. No enrichment function after about +70°C.
- **Acceleration enrichment:** Triggered when there is a positive change in load by means of the potentiometer on the air-flow sensor. How much enrichment there is depends on the temperature of the engine and on how steep and how large the signal from the potentiometer is. Shut-off time is at approx. 1.5 seconds.

During the starting process, when the throttle valve is closed and the engine temperature is higher than + 80°C, acceleration enrichment is suppressed.

- Overrun cutoff and engine speed limitation:

Overrun cutoff takes place place with the throttle valve closed. The speed thresholds are established depending on temperature. Overrun cutoff is suppressed in operation on cruise control (Tempomat).
The cutoff speed for engine speed limitation is at about 5800 min^{-1}.
The hydraulic function is the same for overrun cutoff and engine speed limitation.

- Correction for altitude:

As altitude increases (decreasing air pressure), an adjustment is made in the air-fuel mixture by means of reducing the fuel deliveries. The air pressure is measured by means of a separate pressure sensor with a potentiometer.

- Lambda closed-loop control:

  Lambda closed-loop control, functioning in the familiar manner. Switch-over to open-loop control under certain operating conditions.

- Idle speed control:

  The idle speed control is an additional system. For this function, there is no human intervention using differential pressure controls, but rather a filling control for the engine using a separate idle actuator (instead of an auxiliary-air device).
  Electronic regulation and directing of the idle actuator are accomplished using the KE-control unit.

6. Test equipment and tools

- Universal test adapter ETT 018.01 - 0 684 101 801
  To test the electric/electronic functions of the system.

- Test lead KE-Jetronic 1 684 463 135
  Used in conjunction with the test adapter.

- Multimeter
  Used in conjunction with the test adapter. Commercially available (e.g., Miselco-Master 50 k).

- Pressure tester KDJE-P 100
  To check all fuel pressures and to test the system for leaks.

- Connecting part sets KDJE-P 100/10 and .../11
  For connecting the pressure tester.

- Valve tester KDJE-P 400
  To test the injection valves.

  Tested using: Test gasoline.
  Bosch order designation VS 14 942-CH
  (former part number 5 973 340 650).
  Bosch test gasoline can be obtained in 5-liter drums from the following supplier:

  Oskar Gnamm & Co
  D-7531 Kämpfelbach-Bilfingen

- Lambda closed-loop tester KDJE-P 600
  To test the idle speed control and the lambda closed-loop control.

- Tester for delivered quantity comparison KDJE - P 200
  For comparison of quantities delivered from the individual outlets of the fuel distributor.

- Set of lines KDJE - P 200/25
  To connect the tester for delivered quantity comparison.

- Adjusting wrench KDEP 1035
  For exhaust gas adjustment.

- Adjusting tool KDJE 7456
  Adjustment and fixing in place of the air-flow sensor plate.

- Graduate, capacity approx. 1.5 ltr.
  Commercially available. For measurement of the deliveries from the electric fuel pump.

- Electric connecting cable KDJE 7450/70
  For direct connections to the components being tested.

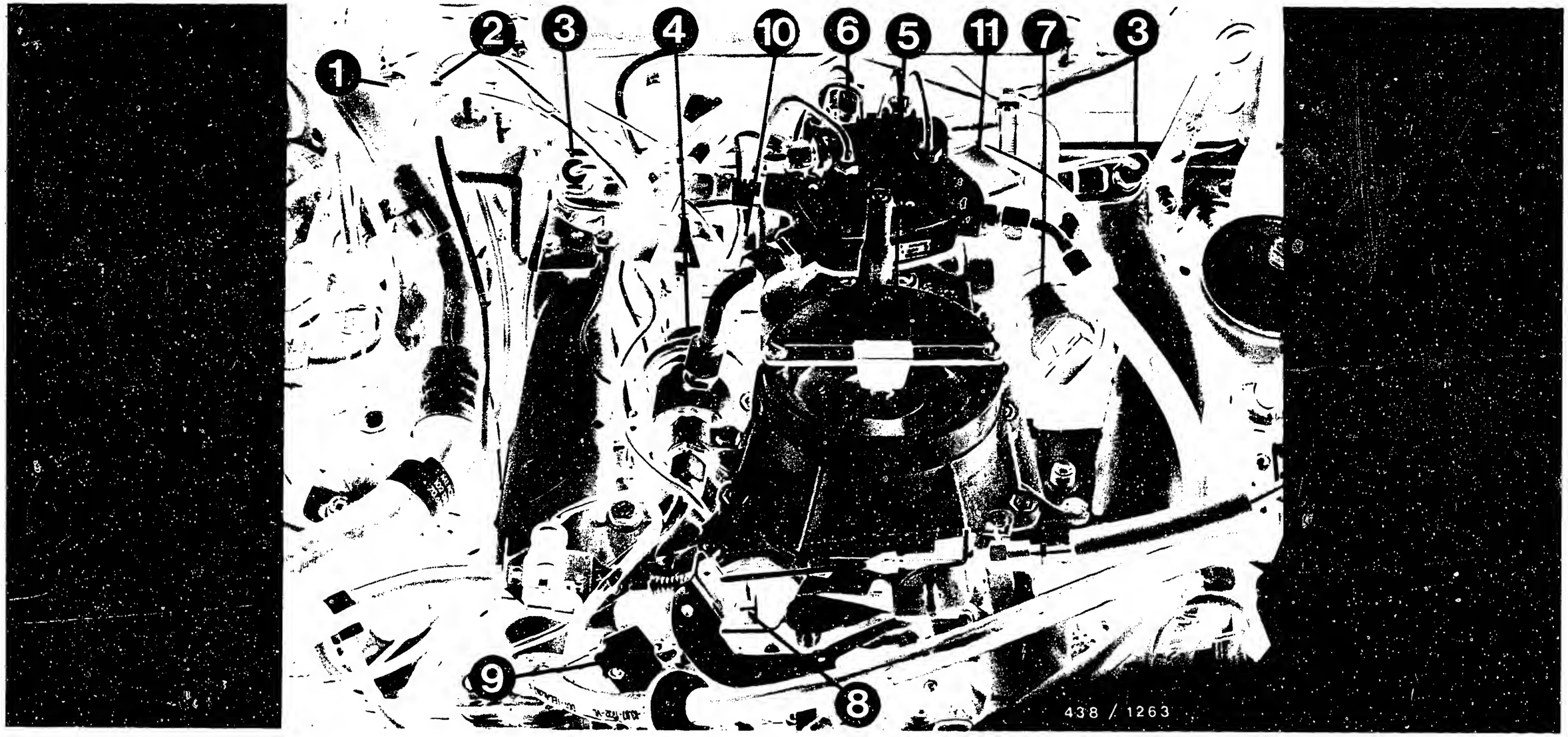
- Tachometer (commercially available)

- CO tester (commercially available)

- Set of tools for removing and installing the CO anti-tamper device in the air-flow sensor
  e.g., Tool set No. 4521/7 from Hazet, D-5630 Remscheid.

- Vacuum pump (commercially available)
  To test the pressure sensor (altitude sensor)
  e.g., "Mityvac" manual vacuum pump, from

  Korinth
  Ludwig-Kloos-Straße 21
  6450 Hanau 7 (Steinheim)

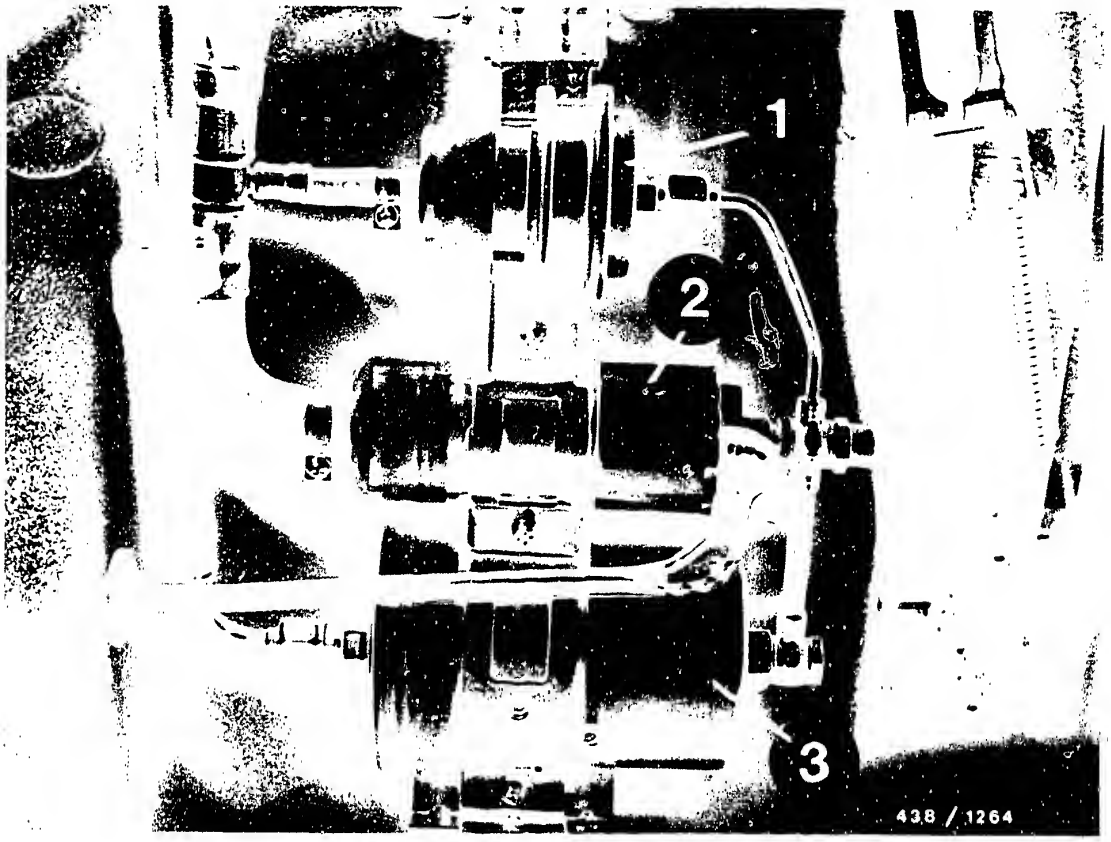


7. Installation position for the various components

1 = Thermo-time switch
2 = Temperature sensor (NTC)
3 = Injection valves, cylinders 1 and 4 (others not visible)
4 = Pressure regulator
5 = Mixture-control unit
6 = Starting valve
7 = Idle actuator
8 = Full load throttle valve switch
9 = Idle throttle valve switch
10 = Air-flow sensor potentiometer
11 = Electro-hydraulic pressure actuator

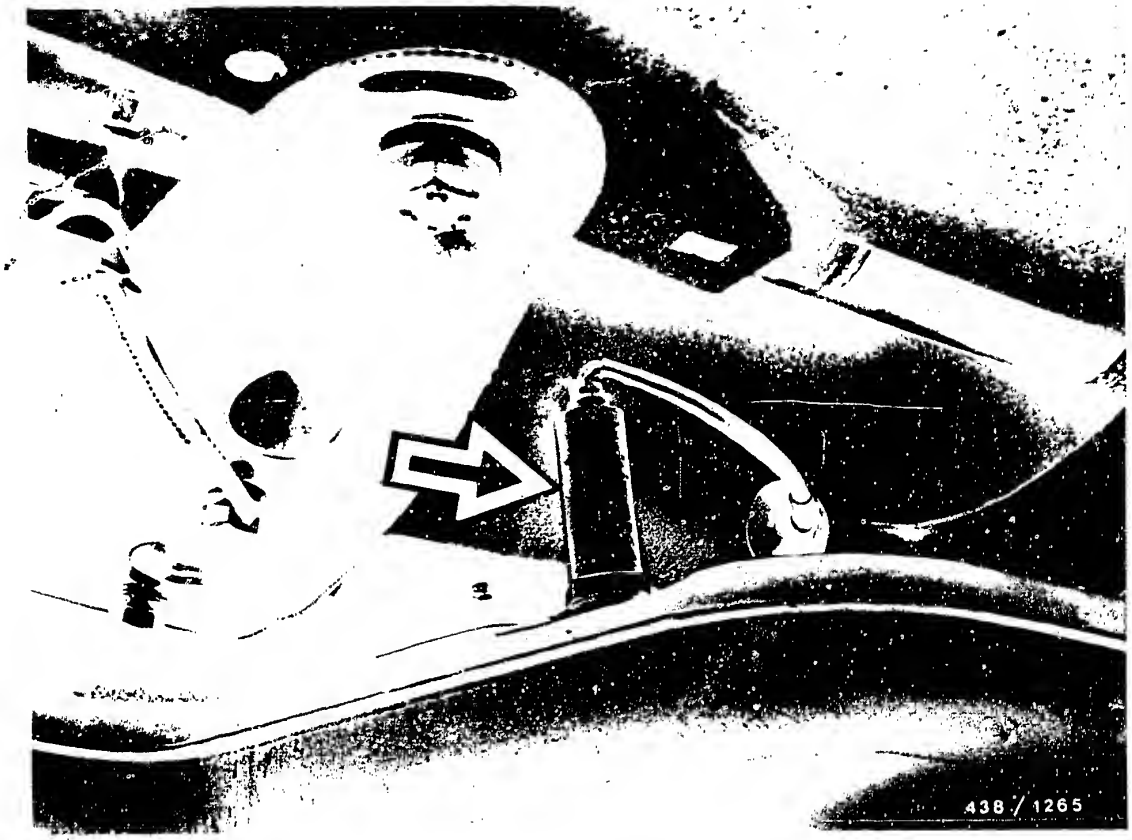
The electronic control unit (arrow) is located in the protected equipment compartment, on the right looking in the forward direction of travel, behind the battery and the ABS control unit.

The pressure sensor (altitude sensor), the electronic over-voltage protection relay, and the electronic engine speed relay are mounted to the left of the control unit. (Not visible in the picture).



1 = Fuel accumulator
2 = Electric fuel pump
3 = Fuel filter

The components of the fuel supply system are mounted on a single support under the floor of the vehicle, on the left looking in the forward direction of travel, in the area in front of the rear axle.



The lambda sensor (arrow) is screwed into the exhaust pipe, on the underside of the vehicle in the area below the front passenger's seat.

Note: Before a new sensor is installed, its threads are to be coated with the special mounting paste VS 14 016 Ft (5 964 080 105). Make certain that only threads are coated and that no paste gets into the slots.

8. Trouble-shooting chart for the KE-Jetronic

Important instructions for the trouble-shooting chart below:

With regard to the way in which its functions are related to one another, the KE-Jetronic differs in significant points from other well-known injection systems.

This makes necessary a structure for the trouble-shooting chart and a sequence of individual test steps designed specifically for the KE.

The trouble-shooting program that follows starts with a trouble-shooting chart (C3 ... C6) in which reference is made to the possible causes corresponding to the fault symptom (customer complaint).

In each cause column, reference is made to the first coordinate of the test step, where the testing of this function has been described in detail.

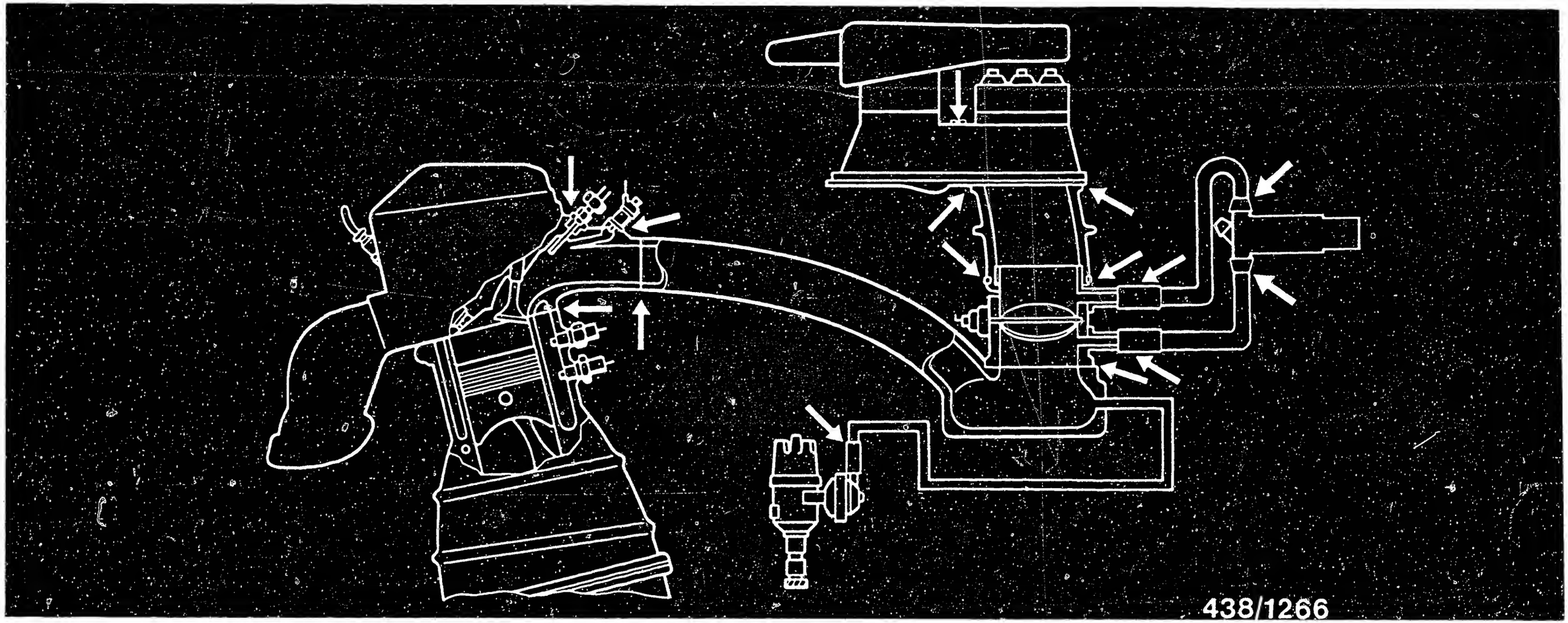
The trouble-shooting program has been structured in such a way that it is possible to carry through a direct trouble-shooting with the fault being identified in accordance with the trouble-shooting chart (C3 ... C6).

8.1 Trouble-shooting chart

Customer's complaint (fault symptom)								
1. Engine fails to start, or starts only with difficulty when cold							Cause (component fault)	Coordinates
	2. Engine fails to start, or starts only with difficulty when warm (hot-starting difficulties)							
		3. Uneven idle during the warm-up phase (shaking)						
			4. Uneven idle with engine warm (shaking)					
				5. Poor throttle take-up, spluttering				
					6. Engine missing during vehicle operation, high load			
						7. Unsatisfactory performance		
●	●				●	●	Electric fuel pump not operating	C 21
	●	●	●	●			Air-intake system of engine leaking	C 7
●	●	●	●	●			Air-flow sensor control lever or control plunger stiff	C 9
	●						Incorrect position of air-flow sensor plate	C 15
●							Defective cold-start system	C 23
		●	●				Start valve leaking	C 23
●	●				●	●	Primary pressure not within tolerance	D 3
●	●	●	●		●	●	Differential pressure not within tolerance	D 3
	●						Overall fuel system leaking	D 3
	●	●	●				Injection valves leaking, opening pressure too low	E 3
		●	●		●	●	Imbalance in fuel delivery (dispersion of deliveries)	E 11
●	●	●	●	●			Idle control incorrect (idle-speed control, lambda closed-loop control)	G 19
						●	Throttle valve does not open fully	F 4
●	●						"Starting enrichment" function not within tolerance	F 4
							"Post-start enrichment" function not within tolerance	F 4
●		●					"Warm-up enrichment" function not within tolerance	F 4
				●			"Acceleration enrichment" function not within tolerance	F 4
●	●						"Idle" throttle valve switch incorrectly adjusted	F 4

Customer's complaint (fault symptom)

8. Engine "diesels"	9. Fuel consumption too high	10. Acceleration problems	11. Idle speed incorrect or unstable	12. Engine starts, but then dies immediately.	Cause (component fault)	Coordinates
					Electric fuel pump not operating	C 21
		●	●		Air-intake system of engine leaking	C 7
●		●			Air-flow sensor control lever or control plunger stiff	C 9
●					Incorrect position of air-flow sensor plate	C 15
●				●	Control plunger seal (free travel of air-flow sensor plate) incorrectly adjusted	C 15
●	●				Start valve leaking	C 23
				●	Primary pressure not within tolerance	D 3
	●	●		●	Differential pressure not within tolerance	D 3
●					Injection valves leaking, opening pressure too low	E 3
	●	●		●	Imbalance in fuel delivery (dispersion of deliveries)	E 11
		●	●	●	Idle control incorrect (idle-speed control, lambda closed-loop control)	G 19
					"Starting enrichment" function not within tolerance	F 4
				●	"Post-start enrichment" function not within tolerance	F 4
		●		●	"Warm-up enrichment" function not within tolerance	F 4
		●			"Acceleration enrichment" function not within tolerance	F 4
		●			"Idle" throttle valve switch incorrectly adjusted	F 4



9. Checking the engine air-intake system for leaks

The arrows in the diagram show typical points where leaks can occur.
Check by performing a visual inspection, or, where there are doubts, check as follows: Disconnect the hose from the outlet of the idle actuator and blow air through this hose into the intake system using a compressed air gun. Open the throttle valve fully while doing this. Brush connection points with soapy water or spray with leak detector (e.g., Güpoflex).

Combustible fluids must not be used under any circumstances to test for leaks.

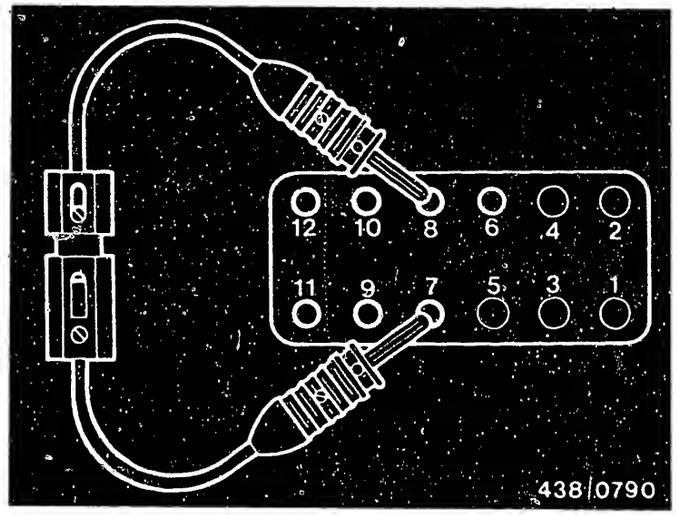
Bubbling or foaming indicates a leak.
Once a leak has been eliminated, it is necessary to conclude by adjusting the idle speed with the engine at normal operating temperature. Idle-speed adjustment is described on coordinates G 19.

10. Checking the control lever in the air-flow sensor and the control plunger in the fuel distributor for ease of movement.

Note: The sensor plate in the air-flow sensor must be flat (not arched), and must be able to pass through at the narrowest point of the air funnel without touching.

10.1 Preparations:

- Engine temperature not below + 20°C.
- Remove the air filter so that the sensor plate in the air-flow sensor is accessible.
- Turn the electric fuel pump on for a few seconds by bridging the electric safety circircuit, so that the control plunger is put under pressure. Bridge by connecting sockets 7 and 8 in the relay base using an auxiliary cable.



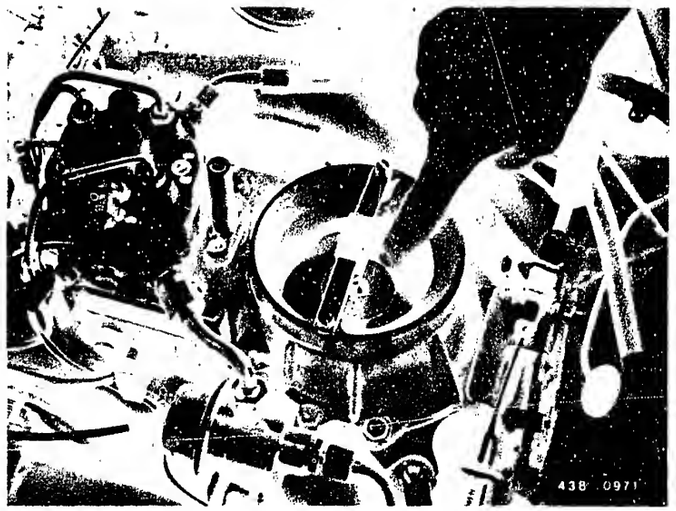
10.2 Check that the control lever moves freely:

Press the air-flow sensor plate down by hand and release it. The sensor plate snaps back into the zero position, and bounces about two more times from the spring-loaded stop.
If the control lever does not move freely, first release all fastening screws holding the air-flow sensor, in order to determine whether housing deformation is the cause of the problem. If the problem is solved by loosening the fastening screws, take out and replace the gasket between the air-supply housing and the air-flow sensor. (Daimler-Benz part). Because this requires removing the air-flow sensor, all fuel connections on the fuel distributor are to be cleaned and disconnected.

Note: When installing the air-flow sensor do not apply any sealing compound between the seal surfaces.
Tightening torque for the air-flow sensor fastening screws: 9...10 Nm.

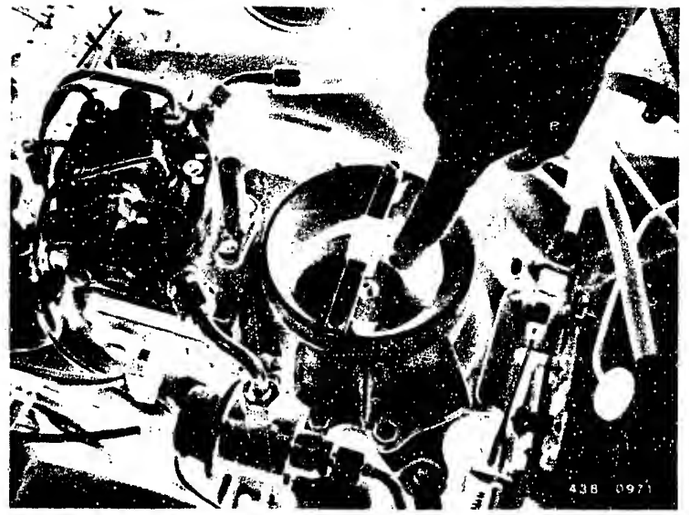
If the problem is not due to housing deformation, take out and replace the air-flow sensor.

Note: It is not possible to repair the control lever mount in the KE-Jetronic air-flow sensor.



10.3 Checking that the control plunger moves freely

Press the air-flow sensor plate down by hand. The same resistance must be felt throughout the entire movement.
Move the sensor plate back quickly to a position just in front of the zero stop. The control plunger follows only sluggishly, but must make noticeable contact with the sensor plate lever.
If the control plunger does not move freely, remove the fuel distributor from the air-flow sensor. Clean the fuel distributor thoroughly in the area near the fuel connections. Disconnect all connections. When loosening or later tightening the fuel connections, hold the fixed hex of the component with a wrench. Unscrew the three fastening screws and remove the fuel distributor from the air-flow sensor.

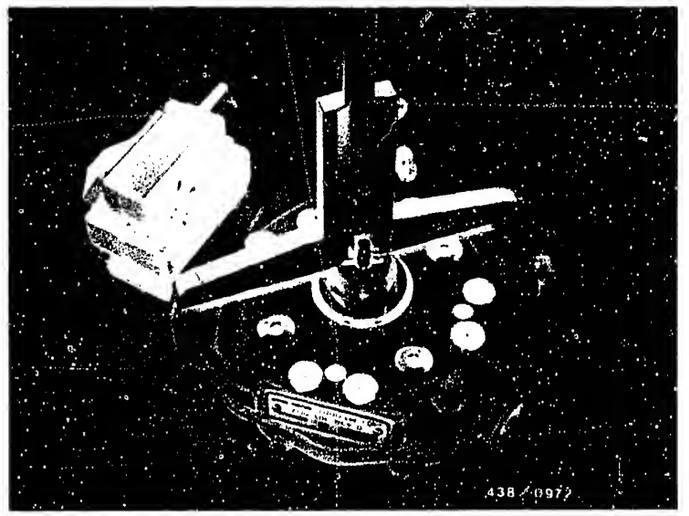


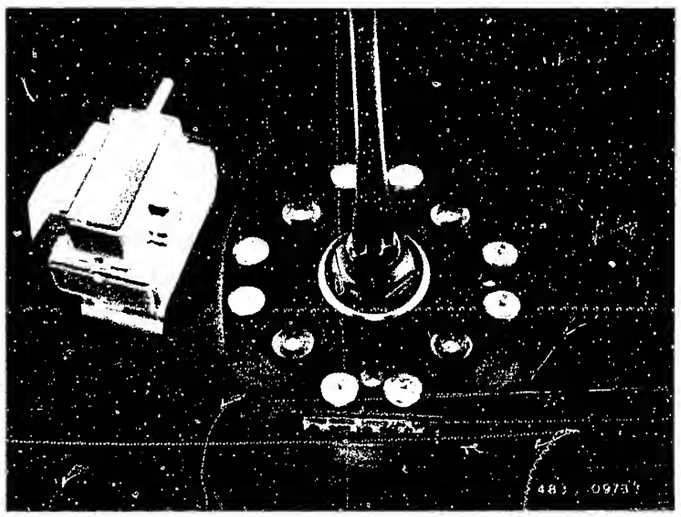
Measure the position of the slotted round nut on the lower plunger seal relative to the fastening nut on the barrel with metering slits using a depth gauge, and note it down for later re-installation. In addition, mark the rotary position of the slotted round nut. Screw out the slotted nut using a shoulder screwdriver and remove the control plunger.

Note: Do not lose the spring above the control plunger!

Clean the plunger thoroughly with benzine or the equivalent. If the plunger has severe striation, or if it is not possible to obtain easy movement by cleaning, take out and replace the fuel distributor assembly. It is not permissible to clean the control plunger by mechanical means.

After putting the spring and the plunger into the fuel distributor, screw the slotted round nut for the lower plunger seal as far as position previously determined during removal, and turn to the marking.
Put the fuel distributor back on the air-flow sensor. In so doing, use a new seal ring between the air-flow sensor and the fuel distributor. Maintain exactly the tightening torque of 3.2...3.8 Nm for the fuel distributor fastening screws.





10.4 Additional instructions for mechanical adjustment of the mixture-control unit.

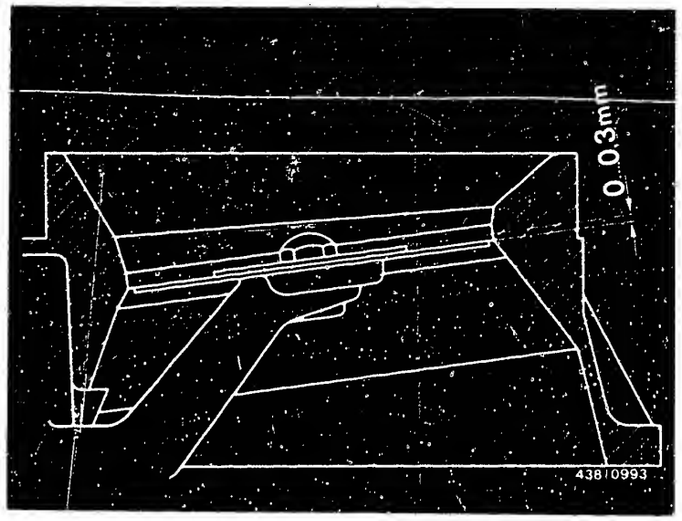
Because of the lower control plunger seal in the KE-fuel distributor, it is not permissible, when the overall adjustment of the mixture-control unit is correct, for the control plunger to be in contact with the needle-roller bearing of the sensor plate intermediate lever. The sensor plate control lever must have free travel between the zero position (rest position for the sensor plate) and contact with the control plunger. In the center of the air-flow sensor plate, with the electric fuel pump running, this should be from 1...2 mm.

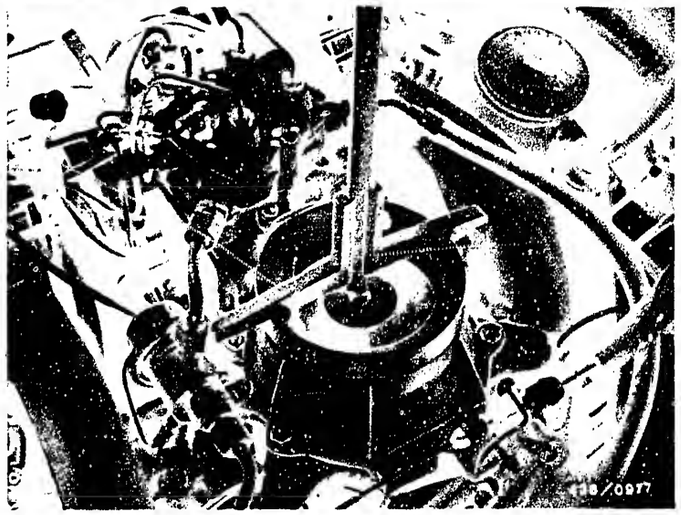
A correct overall adjustment of the mixture-control unit means:

- The zero position for the air-flow sensor plate has been adjusted correctly. Check the zero position as follows:

  Remove the stop bracket on the air funnel. Hold the air-flow sensor plate in its basic position using a depth gauge and measure the distance to the top edge of the relief funnel. Basic position (diagram): Top edge of the sensor plate flush with the bottom junction edge from the cylindrical zone to the air funnel. (Judged visually). Then measure the difference up to the zero position of the air-flow sensor plate. This must be between 4.2 and 4.4 millimeters.

- Idle adjustment of the engine in order (Coordinates G 19).

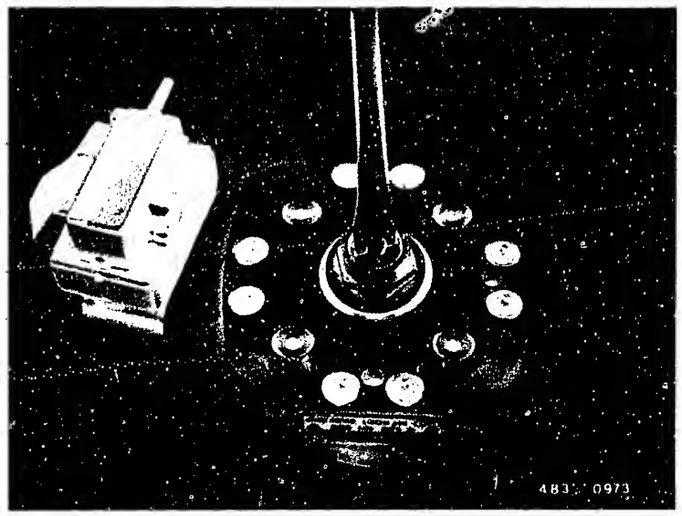




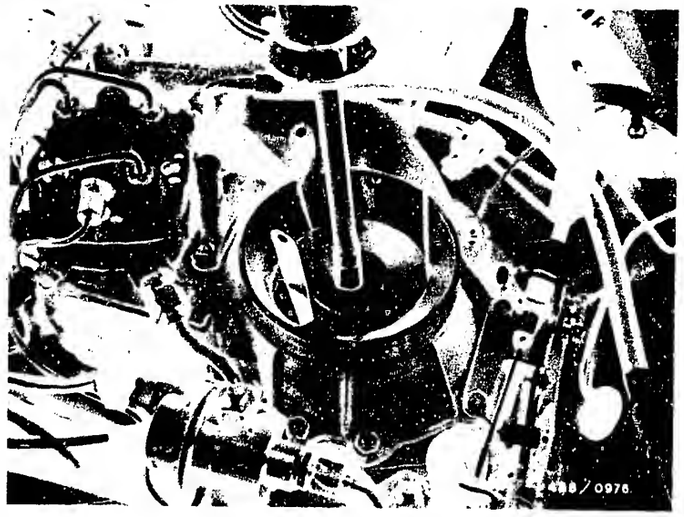
If, despite a correct zero position of the air-flow sensor plate, and in spite of a correct idle adjustment, the free travel called for is not within the range from 1 to 2 millimeters, the fuel distributor is to be taken off again, and appropriate correction is to be made on the slotted round nut of the plunger seal and, with that, on the position of the plunger.

Note: Screwing the slotted round nut in by 0.1 mm produces an increase in the free travel in the center of the air-flow sensor plate of approx. 0.7 mm, and vice-versa.

Finally, re-check the idle adjustment, and, if need be, correct it.
(Coordinates G 19).



11. Centering and zero position for the air-flow sensor plate:



11.1 Centering the air-flow sensor plate:

The sensor plate must be flat (not arched) and must be able to move through the narrowest part of the air funnel without touching.

If necessary, center the air-flow sensor plate.
To do so, remove the stop bracket. Release the sensor plate fastening screw and retighten it with 2 or 3 0.05 mm feeler gauges inserted.
Tightening torque: 5...5.5 Nm.

Important note on the sensor plate fastening screw:

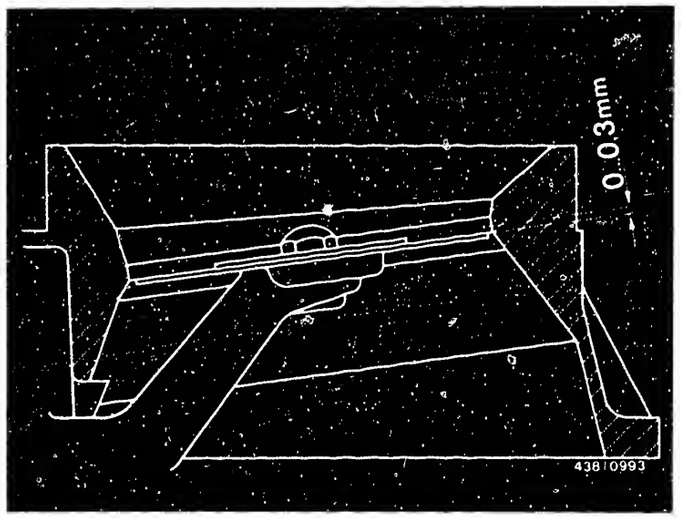
To lock the screw in place, it has been micro-encapsulated in the factory, and for that reason, it is difficult to loosen or to turn. Do not use force to loosen a screw that is very tight. Instead, warm it slightly using a soldering iron.

NO OPEN FLAME!

If a screw has been loosened several times and can be turned very easily, unscrew it, clean it, and coat it with a small amount of screw locking compound (e.g., Loctite). In so doing, coat only a few threads, in order that subsequent loosening will be possible.

Once the screw has been tightened with the prescribed tightening torque, it must no longer be possible to turn the air-flow sensor plate by hand.

11.2 Air-flow sensor plate position (zero position)



The point of departure for determining the zero position of the air-flow sensor plate is the basic position of the air-flow sensor plate.

Definition of the basic position:

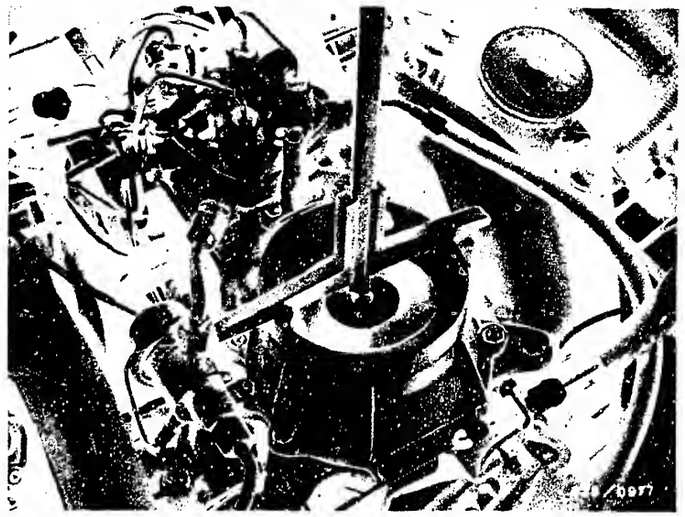
Top edge of the air-flow sensor plate flush with the bottom junction edge from the cylindrical area to the air funnel. Maximum deviation upward: 0.3 mm. Visual evaluation on the outside of the air funnel.

Definition of the zero position (spring-loaded stop):

Position of the air-flow sensor plate between 4.2 and 4.4 mm higher than the basic position, measured in the center of the sensor plate.

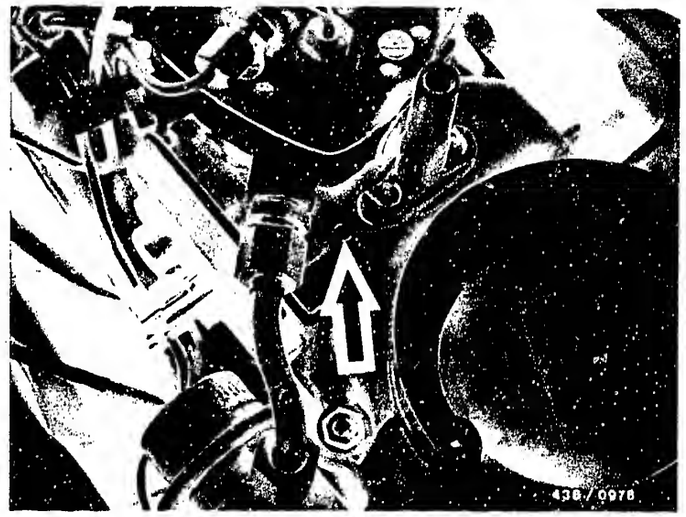
Procedure:

Using a depth gauge in the center of the air-flow sensor plate, establish the basic position with respect to the top edge of the relief funnel and take the measurement. Then measure the distance to the zero position, which must lie within the range of 4.2...4.4 mm.



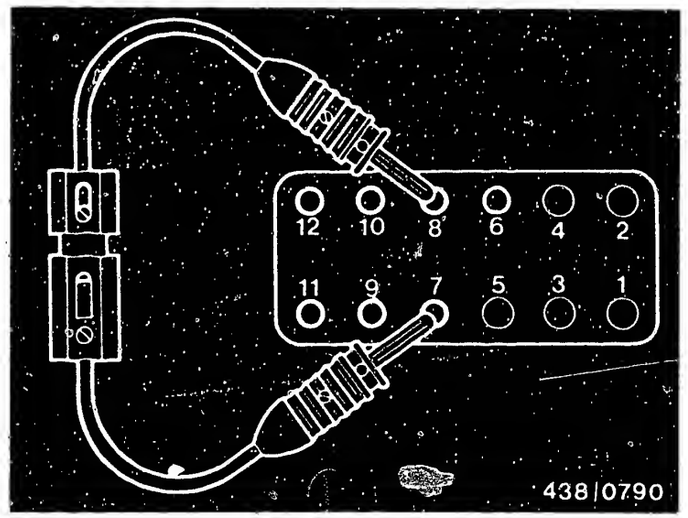
If the position of the air-flow sensor plate is too high, an adjustment can be made. To do so, drive the guide pin (arrow) for the stop leaf spring appropriately lower, using a mandrel and a light hammer.

Note:
Be very careful in making this adjustment so that the guide pin is not driven in too deep. Avoid repeated adjustment in both directions, because the press fit on the pin will become inadequate. A pin that has fallen out can cause serious damage to the engine.

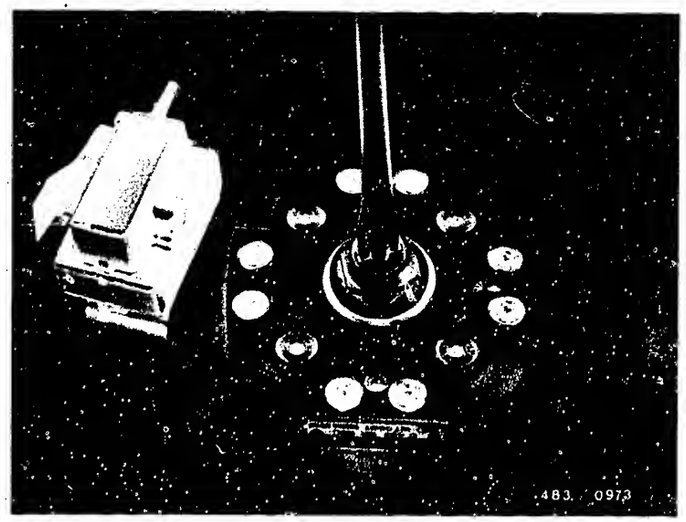


11.3 Adjusting the lower plunger seal in the fuel distributor:

Turn on the electric fuel pump by bridging the electric safety circuit, in order to put the control plunger under pressure. To do this, connect sockets 7 and 8 in the relay base using an auxiliary cable.



When the zero position of the air-flow sensor plate has been adjusted correctly, it is not permissible for the control plunger to touch the needle-roller bearing in the sensor plate intermediate lever. To check this, press the air-flow sensor plate down lightly. The sensor plate lever must have free travel between the zero position and contact with the control plunger. This free travel is to be between 1...2 mm.



For correction, remove the fuel distributor and screw the slotted round nut on the plunger seal correspondingly further in or out. Changing the depth screwed in by 0.1 mm produces about 0.7 mm in the center of the air-flow sensor plate.

Special case:

If ever the slotted round nut on the plunger seal and the idle-mixture-adjusting screw in the air-flow sensor should simultaneously be out of place by an unknown amount, the free travel can, under some circumstances, be eliminated completely or be far too great. In that case, an adjustment can be made as follows:

Remove the fuel distributor and screw back the slotted round nut, flush with the collar on the hex nut.

On the air-flow sensor, using a depth gauge, measure the dimension from the fuel distributor support (threaded eyes) to the needle-roller bearing in the control lever, and by adjusting the idle-mixture-adjusting screw, set it at 21.2 $\pm$ 0.1 mm. Mount the fuel distributor. There is now no free travel present.

Have the engine warmed up and make the idle adjustment (Coordinates G 19).

Take the fuel distributor back off and screw the slotted round nut about 0.6 mm further in. Put on the fuel distributor. With the electric fuel pump running, check the free travel. If need be, take the fuel distributor off again, and correct the slotted round nut appropriately.
Note: Changing the depth by which the slotted round nut is screwed in by 0.1 mm produces about 0.7 mm in the center of the air-flow sensor plate.

Finally connect all lines to the fuel distributor. Re-check the idle adjustment, and if need be, correct it. (Coordinates G 19).

12. Checking the operation of the electric fuel pump

12. 1 Measuring point

Conclusive information on the operation of the electric fuel pump can only be given by a measurement of fuel delivery under pressure, i.e., under primary (system) pressure. For that reason, this measurement is taken at the return line connection on the pressure regulator (diagram at top - arrow).

Unscrew the fuel return line from the pressure regulator. In so doing, hold the fixed hex on the pressure regulator with a wrench. Connect a hose with a tapered connection M14 x 1.5 to the return connection on the pressure regulator. For testing, hold the hose in the crucible.

12.2 Testing

Bridging the electric safety circuit, turn the electric fuel pump on for exactly one minute and measure the fuel delivery in the graduate.
Bridge the safety circuit by connecting sockets 7 and 8 in the relay base using a connecting cable.

12.3 Test specification for measurement of fuel delivery

Fuel delivery: Min. 1100 cm^3/min.

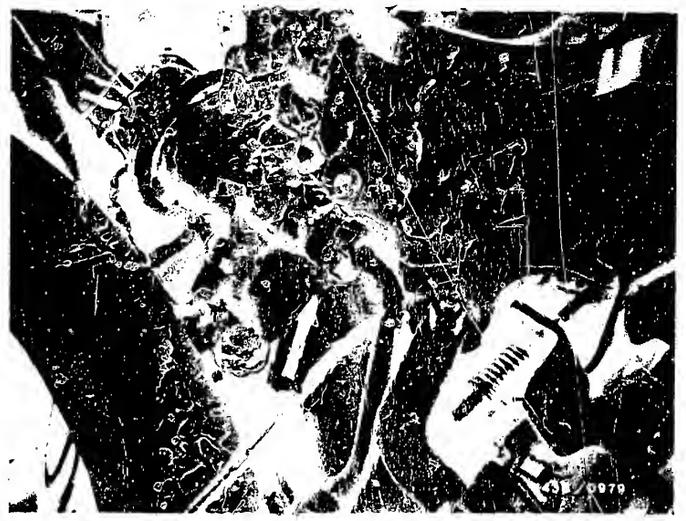
12.4 Possible causes for insufficient fuel delivery

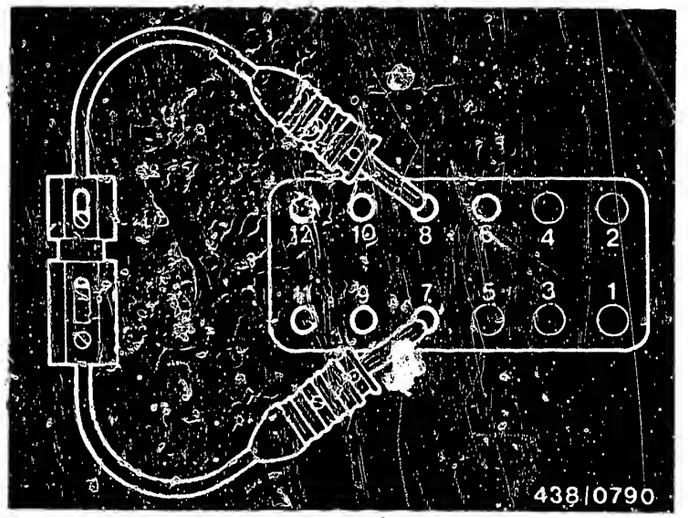
- Power supply to the electric fuel pump defective. Voltage drop.
  Minimum voltage at the connection terminals with the electric fuel pump running: 11.5 V.
- Fuel filter very dirty.
- Filter in the double fitting in the fuel distributor inlet clogged.

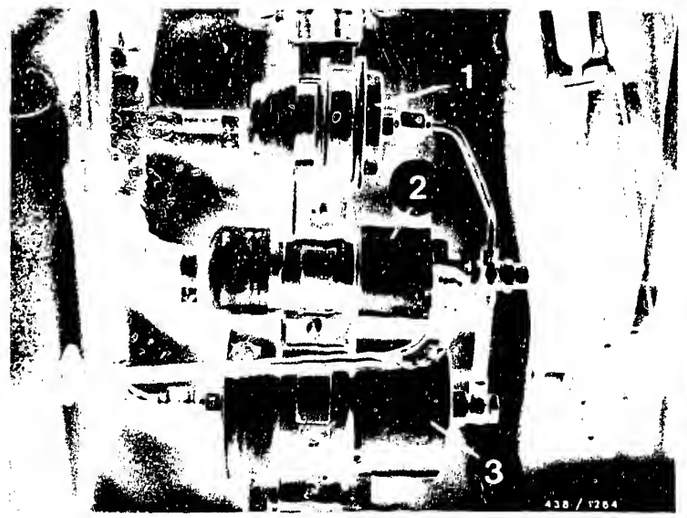
If these points are in order, the fault lies with the electric fuel pump itself. Take out and replace the electric fuel pump.

12.5 Removing and installing the electric fuel pump

Pinch off the fuel intake hose (e.g., with hose clamper W 157 from Matra) and remove the suction hose on the electric fuel pump (2). Catch any fuel that flows out. Unscrew the pressure line shared by the fuel filter (3), the electric fuel pump, and the fuel accumulator (1). In so doing, hold the fixed hex of the components with a wrench. Take out and replace the electric fuel pump and make connections in the reverse order. Use new gasket rings when connecting the pressure line.



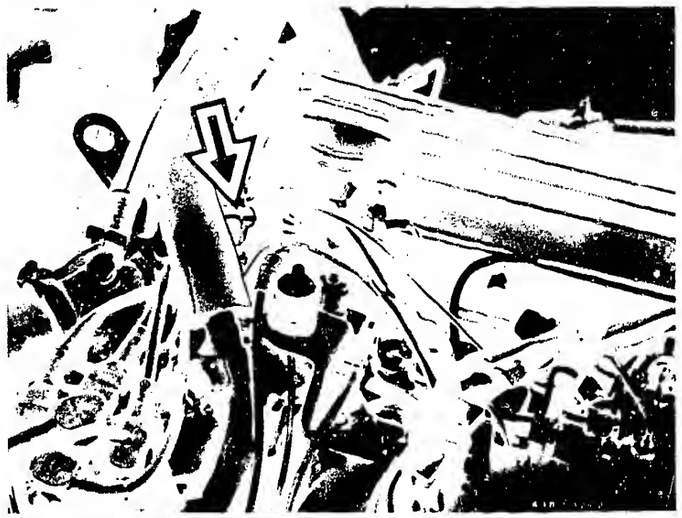




13. Checking the cold-starting system (thermo-time switch/start valve)

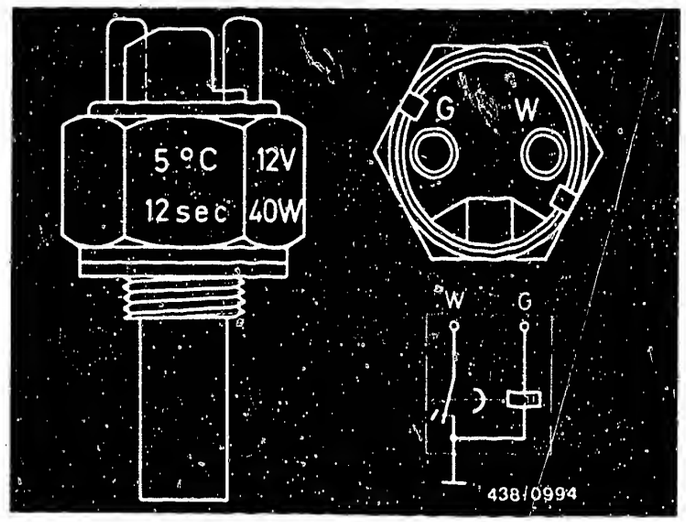
13.1 Thermo-time switch

For testing, take out the thermo-time switch (diagram at top, arrow). Whenever possible, remove only while the engine is cold, since some coolant escapes. The amount lost would be significantly greater with a warm engine.



The switching temperature of +5°C and the switching time at -20°C of 12 seconds are stamped in on the hex of the thermo-time switch.
Once removed, the thermo-time switch is tested against the values below using an ohmmeter. Cooling to temperatures below 0°C is done in the freezer.

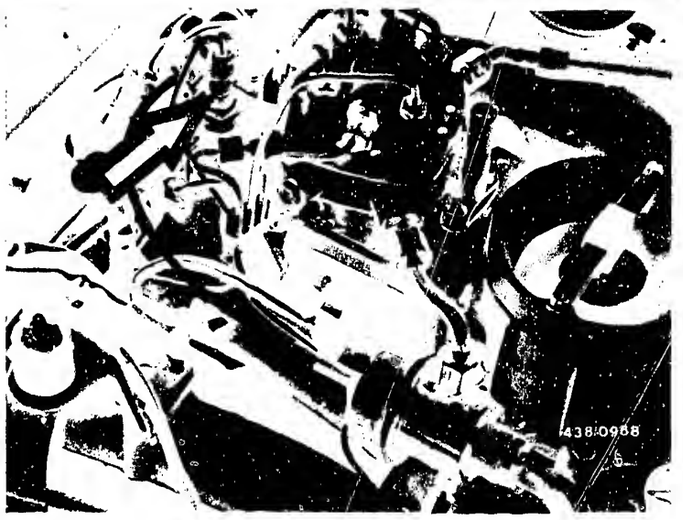
At a temperature below °C	above °C	Measure resistance between Terminal "G" and ground (housing)	Terminal "W" and ground (housing)	Terminals "G" and "W"
0		75 ... 110 Ω	0 Ω	75 ... 110 Ω
	+10	75 ... 110 Ω	∞ Ω	∞ Ω



13.2 Start valve

For testing, take out the start valve (diagram at bottom, arrow). To loosen the fuel line, hold the hex of the double threaded fitting with a wrench.

Also unscrew the fuel line to the start valve on the fuel distributor (center connection).



Using the hose from the set of connecting-parts KDJE-P 100/11 and the double threaded fitting M 8x1/M 12 x 1.5, connect the start valve directly to the start valve connection on the fuel distributor. To test, hold the start valve in the graduate.

Using connecting cable KDJE 7450/70, connect the start valve directly to ground and to terminal 15 (socket 9 in the relay socket of the electric safety circuit).

N.B.:
Do not connect the start valve directly to B+!
Danger of fire due to sparks!

Test procedure:

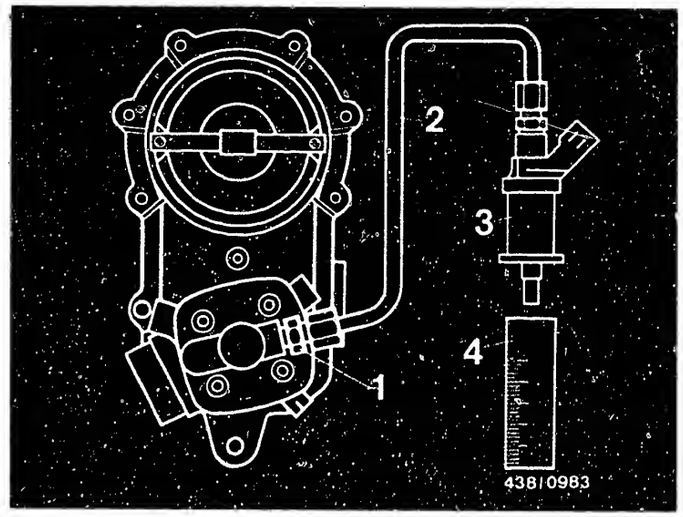
Turn the electric fuel pump on by bridging the electric safety circuit. To do this connect sockets 7 and 8 using an auxiliary cable. (Diagram below).
Hold the start valve in the graduate and turn on the ignition. The spray from the start valve must be finely atomized and have an even cone.

Turn the ignition back off and dry the nozzle of the start valve. Remove the connecting cable.

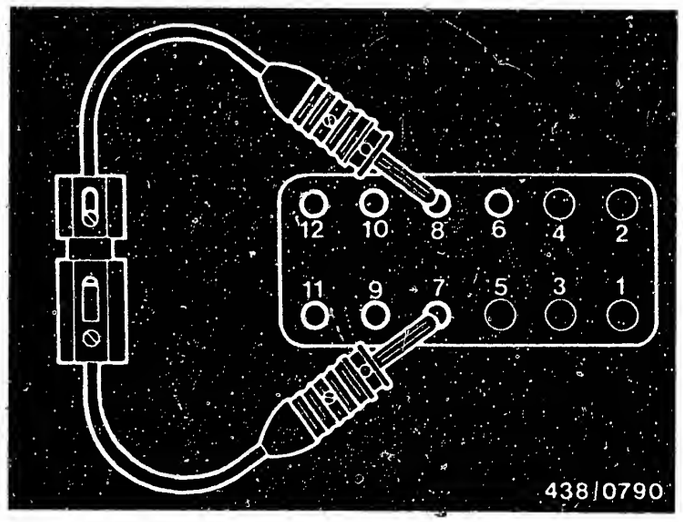
It is not permissible for any drops to drip from the nozzle during the next minute. The start valve must not leak even when shaken or pounded.

Then turn the electric power pump back off. Take out and replace any start valve that does not open or that leaks.

If the thermo-time switch or the start valve have been taken out and replaced, then the idle adjustment must be checked and, if need be, corrected. See Coordinates G 19.



1 = Double threaded fitting M 8x1/M 12x1.5
2 = Hose from KDJE - P 100/11
3 = Start valve
4 = Graduate



14. Measuring pressures

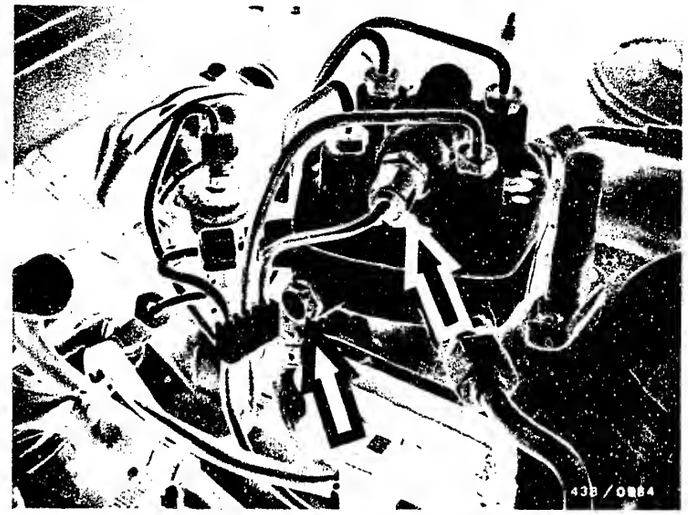
14.1 Primary (system) pressure

Attaching pressure tester KDJE - P 100

Use connecting-part sets KDJE - P 100/10 and .../11 to attach.

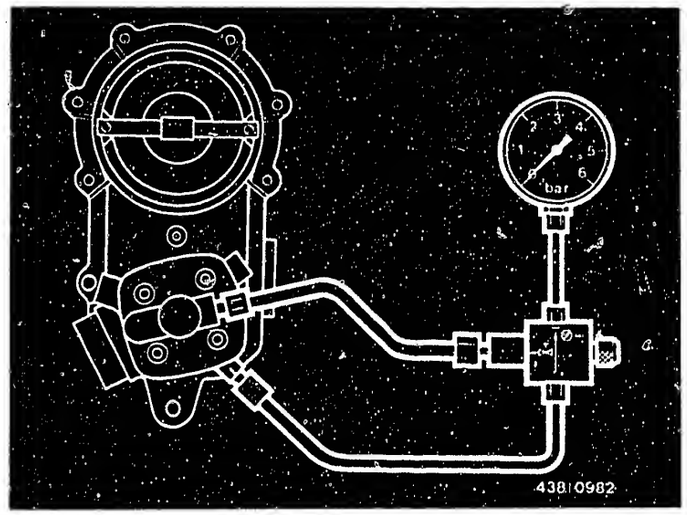
Important note:

To connect the pressure tester, there is a special measuring office on the bottom part of the fuel distributor housing that is plugged with a screw during operation. (Diagram, lower arrow). The residual pressure in the primary pressure circuit must be dissipated before the plug screw is opened. To do this, always loosen the connection for the start valve (center connection on the fuel distributor) first. (Diagram - upper arrow).



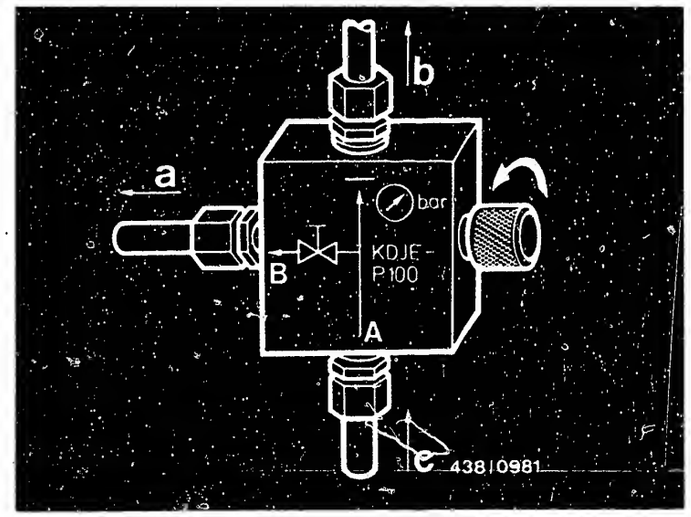
Connection "A" on the directional-control valve is connected to the measuring orifice in the fuel distributor with the aid of the double threaded fitting M 8 x 1/M 12 x 1.5 from KDJE - P 100/10.

Connection "B" is connected to the start valve connection on the fuel distributor using the hose from KDJE - P 100/11.



Checking the primary pressure:

Open the valve screw on the directional-control valve (turning counter-clockwise).



Turn the electric fuel pump on by bridging the electric safety circuit. To do this, bridge sockets 7 and 8 in the relay base using a connecting cable.

The pressure gauge on the pressure tester shows the primary pressure.

Test specification for primary pressure: 5.25...5.6 bar gauge pressure.

Possible causes if the primary pressure is too low:

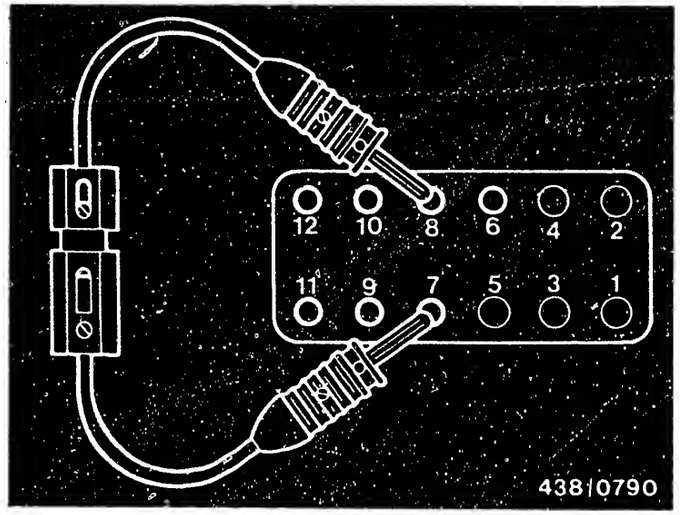
- Fuel supply system not in order. Fuel delivery of the electric fuel pump insufficient.
  Measure the fuel delivery at the return connection on the pressure regulator.
  Test specification: Min. 1100 cm³ per minute.

- Pressure regulator for primary pressure not in order.
  Take out and replace the pressure regulator.

Possible causes if the primary pressure is too high:

- Fuel return to the fuel tank is being constricted.
  To check this, direct the return from the pressure regulator into a separate container.

- Pressure regulator for the primary pressure is not in order.
  Take out and replace the pressure regulator.

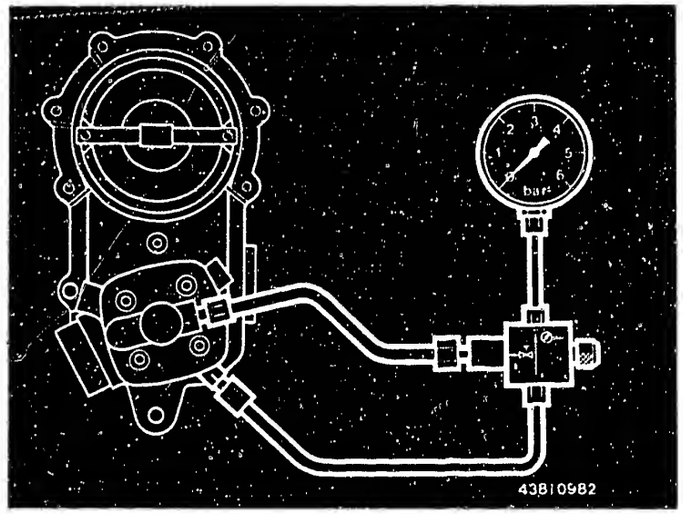


14.2 Checking the differential pressure

The basic coordination of the KE-Jetronic and the electronically controlled correction functions are accomplished using differential pressure control. The differential pressure (difference in pressure between the primary pressure and the pressure in the lower chambers of the differential pressure valves in the fuel distributor) is determined by the operation of the electrohydraulic pressure actuator mounted on the fuel distributor.

The electrical and the hydraulic functioning of the pressure actuator is evaluated by means of the differential pressure measurement below. If this functioning is in order, possible defects in the correction function can be due only to problems in the sector controlling the pressure actuator.

Because the differential pressure is measured dependent on the triggering current to the pressure actuator, the universal test adapter with the multimeter is to be connected up for this procedure.



Attaching pressure tester KDJE-P 100

Attachment using connecting sets KDJE-P 100/10 and .../11.

Important note:

There is a special measuring orifice on the bottom part of the fuel distributor housing for connecting the pressure tester. This is plugged during operation (diagram - lower arrow). Before the screw plug is opened, the residual pressure in the primary pressure circuit must be dissipated. To do this, always release the connection for the start valve first (center connection on the fuel distributor (diagram - upper arrow).

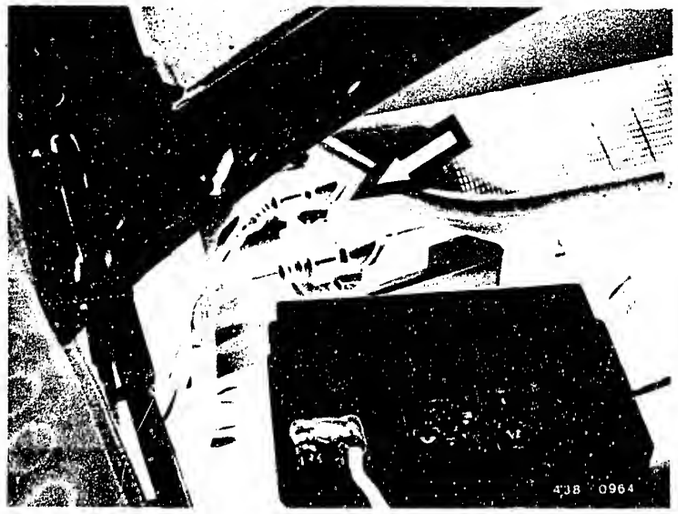
Connect connection "A" on the directional-control valve to the measuring orifice in the fuel distributor using the double threaded fitting M 8 x 1 / M 12 x 1.5 from KDJE-P 100/10.

Join connection "B" to the connection for the start valve on the fuel distributor using the hose from KDJE-P 100/11.

Connection of the universal test adapter

Note:
In vehicles with ABS, remove the ABS control unit before taking out the KE-control unit. (Open the clamper and lift the control unit from the mounting with the multiple plug connected to it.)

Shove the KE-control unit (arrow) upward in the mounting and take it out.



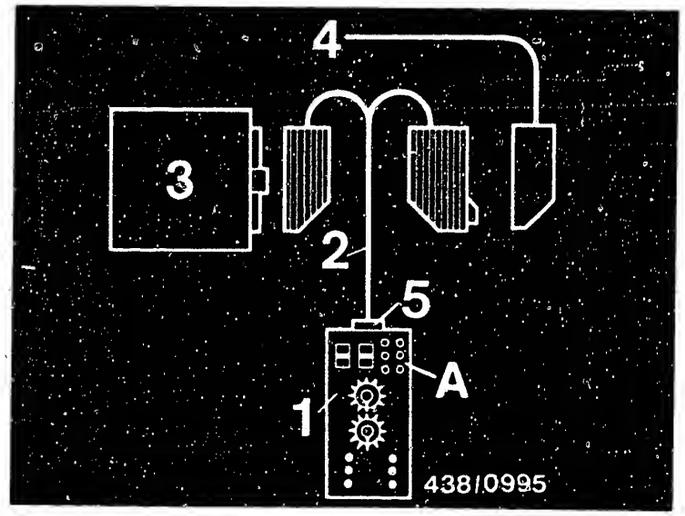
1 = Universal test adapter
2 = System adapter lead
3 = Control unit
4 = System-wiring harness
5 = Pin terminal

Remove the multiple plug on the control unit. (Push back the detent and hinge the plug up on the detent side first). Connect the lead plug to the edge connector for the test cable of the universal test adapter.

Connect the test lead multiple plug to the control unit.

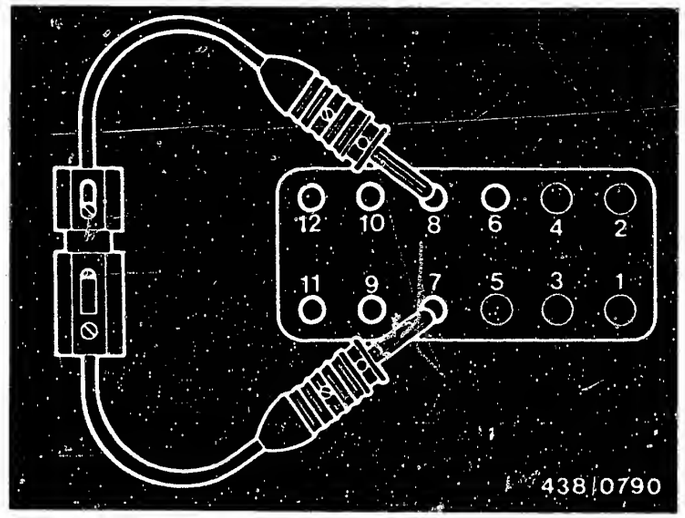
Connect the test lead to the universal test adapter across the pin terminal.

Connect the ammeter (e.g., Miselco Master 50 K multimeter) to the black connection sockets (A) of the universal test adapter in accordance with instructions from the manufacturer.



Procedure

Turn the electric fuel pump on by bridging the electric safety current. To do so, bridge sockets 7 and 8 in the relay base.

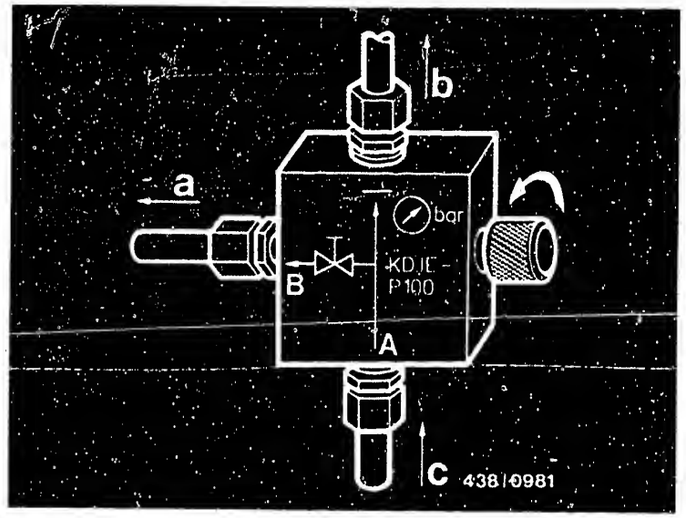


Open the valve screw of the directional-control valve on the pressure tester (turning counter-clockwise).

The pressure gauge now shows the primary pressure.

Test specification: 5.25 ... 5.6 bar gauge pressure

Note down the value as measured.



Possible causes for incorrect results in measurement:

- Fuel supply system defective. Deliveries from electric fuel pump insufficient.

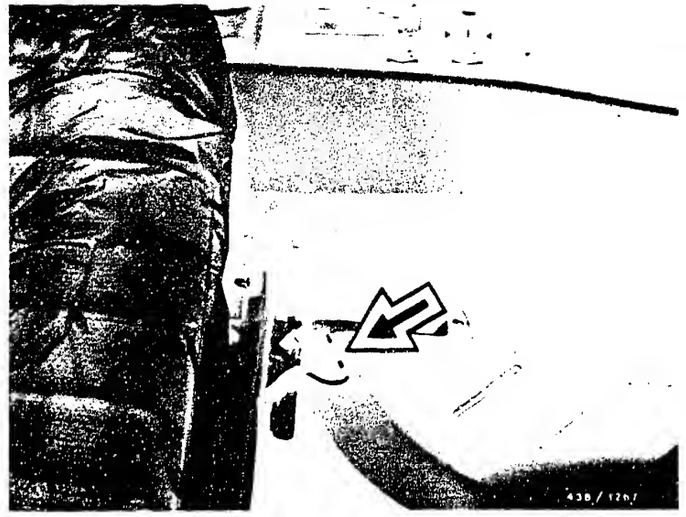
  Test specification: Min. delivery 1100 cm³/min.

- Fuel return line to the fuel tank constricted. To check this, unscrew the return line on the pressure-regulator for primary pressure and direct the return flow into a separate container.

- Pressure regulator for primary pressure is not in order. Take out and replace the pressure regulator.

Measure the "warm" lower chamber pressure:

Take apart the connector in the connecting lead for the lambda sensor. This connector in the sensor lead is located under the carpeting in front of the front passenger's seat. (Arrow, single-lead wire).

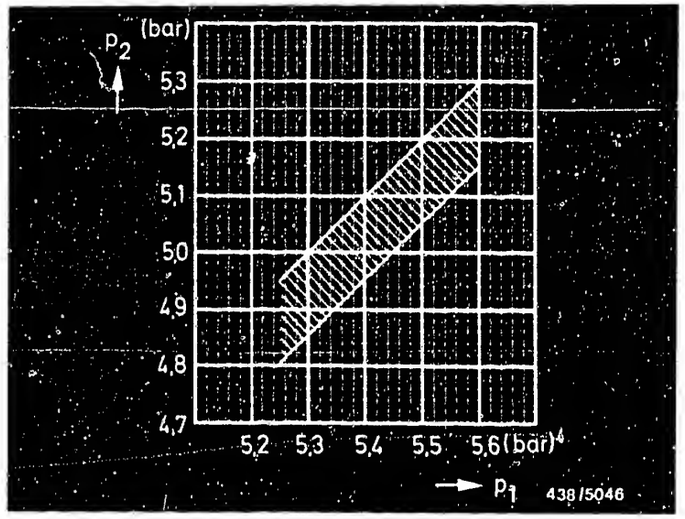


Turn on the ignition. The control unit now works on "open-loop control": The actuator current is approx. 8 mA.

Close the valve screw on the directional-control valve (turning clockwise).

The pressure indicated on the pressure gauge must drop below the primary pressure as determined above.

Obtain the setting value for "warm" lower chamber pressure from the graph in accordance with the primary pressure as measured.



p_1 = Primary pressure, p_2 = Lower chamber pressure, actuator current = 8 mA

Possible causes for incorrect results in measurement:

- Fuel decoupling throttle in the fuel distributor is clogged. To check, measure the overflow:

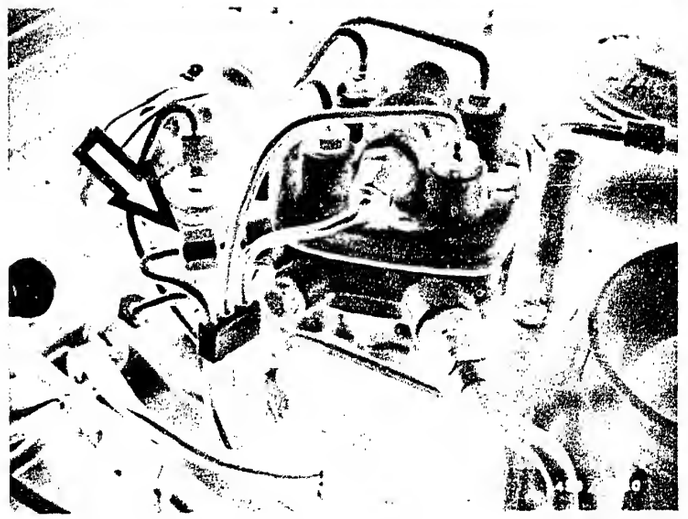
  Unscrew the thin fuel line to the pressure regulator on the fuel distributor, and plug it (diagram at bottom - arrow). Connect a hose with a tapered connection M 10x1 to the free connection, and measure the overflow.

  Test specification: 130 ... 150 cm^3/min.

  If that value is not attained, take out and replace the fuel distributor.

- Electrohydraulic pressure actuator is defective. Take out and replace the pressure actuator.

  To do this, clean the fuel distributor in the area near the pressure actuator. The new pressure actuator is supplied only as a set of parts, with new seal rings and new fastening screws. As a rule, use only new seal rings and the original fastening screws to put the pressure actuator on. (Non-magnetic steel).



Measure the "cold" lower chamber pressure:

The lead for the lambda sensor remains apart.

Remove the lead plug on the temperature sensor (NTC) (arrow).

The valve screw on the directional-control valve remains closed (turning clockwise).

Switch the ammeter to the range 0 ... 100 mA.

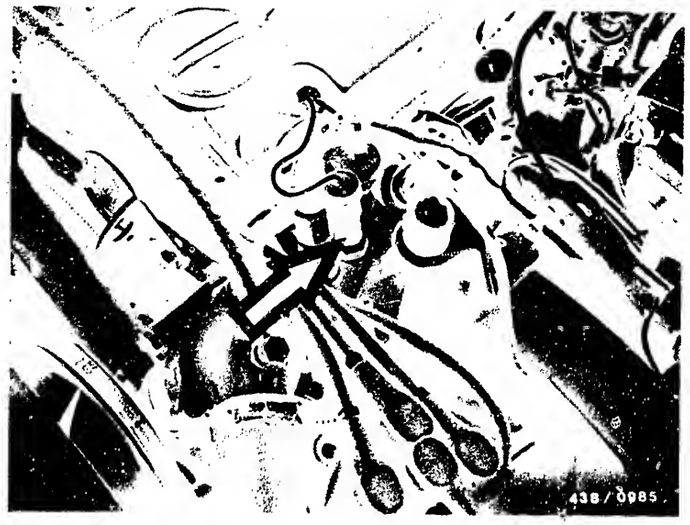
Turn on the ignition.

Determine the setting value required for the lower chamber pressure from the graph according to the actuator current now shown on the ammeter and the primary pressure as measured above.

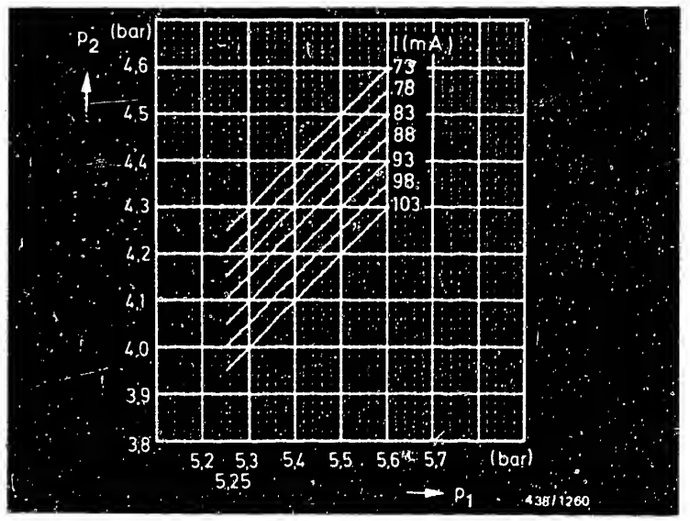
Note the tolerance of ± 0.15 bar that is to be allowed for each characteristic curve!

If the value found is above or below the setting value required for lower chamber pressure, the fault lies with the electrohydraulic pressure actuator. Take out and replace the pressure actuator.

To do this, clean the fuel distributor in the area near the pressure actuator. The new pressure actuator is supplied only as a set of parts with seal rings and fastening screws. As a rule, use only new seal rings and the original fastening screws to put on the pressure actuator (non-magnetic steel).



p_1 = Primary pressure
p_2 = "Cold" lower chamber pressure, tolerance + 0.15 bar
I = Actuator current (mA)



14.3 Checking the overall fuel system for internal leaks.

Attach pressure tester KDJE-P 100

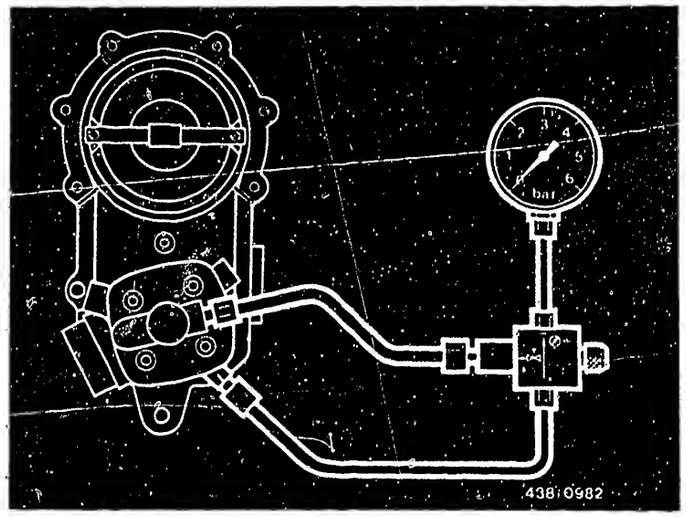
Attach using connecting-part sets KDJE-P 100/10 and ... /11.

Important note:

There is a special measuring orifice on the bottom part of the fuel distributor housing to connect the pressure tester. This hole is closed during operation (diagram - lower arrow). Before opening the screw plug, the residual pressure in the primary pressure circuit must be dissipated. To do this, always release the connection for the start valve first (center connection on the fuel distributor) (diagram - upper arrow).

Connect connection "A" on the directional-control valve to the measuring orifice in the fuel distributor, using the double threaded fitting M 8 x 1 /M 12 x 1.5 from KDJE-P 100/10.

Connect connection "B" to the connection for the start valve on the fuel distributor, using the hose from KDJE-P 100/11.

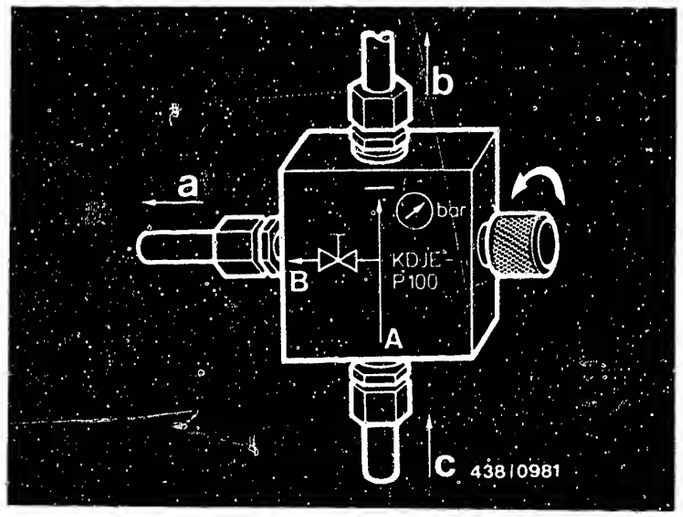


Procedure:

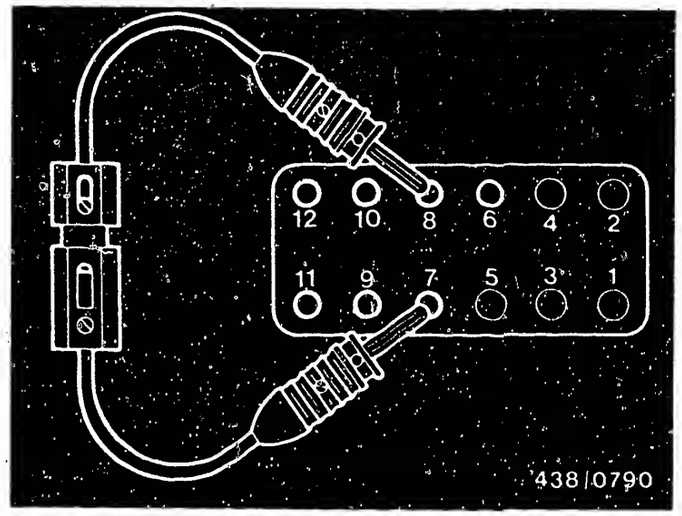
This test is performed with the engine at standstill.

Run the test with the engine at normal operating temperature, but not immediately after it has been run up to a very high temperature.

Open the valve screw on the directional-control valve of the pressure tester (turning counter-clockwise).



Bridging the electric safety circuit, turn on the electric fuel pump (bridge sockets 7 and 8 in the relay base), until primary pressure has built up and then turn the pump back off. Watch the drop in pressure on the pressure gauge.



Test specifications for the test for leaks:

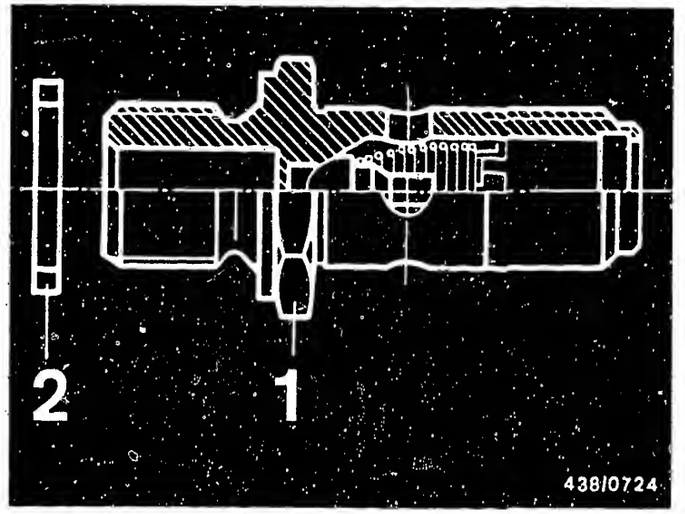
Minimum pressure after 10 minutes: 2.7 bar gauge pressure

Minimum pressure after 20 minutes: 2.6 bar gauge pressure

Possible causes for leaks (too rapid a drop in pressure):

- The non-return valve on the pressure-end tube fitting of the electric fuel pump leaks.

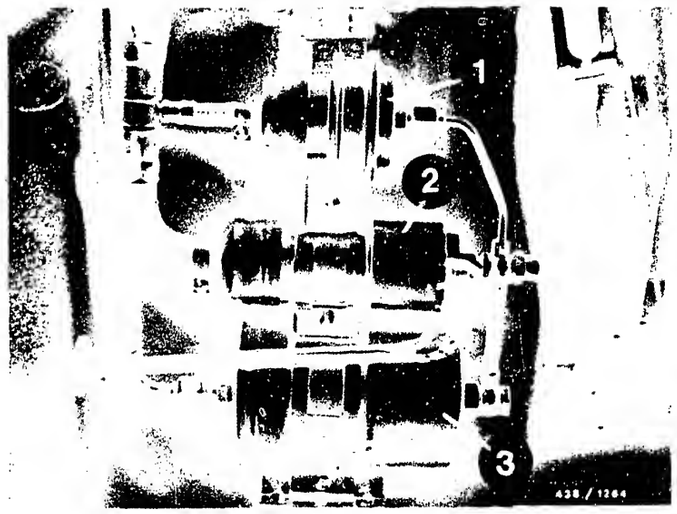
  To check this, pinch off the suction line for the electric fuel pump (e.g., with hose clamper W 157 from Matra) and repeat the test for leaks. If the leak has been eliminated, take out and replace the tube fitting.
  The new tube fitting (1) is supplied along with the appropriate seal ring (2) as a set of parts under part number 1 587 010 006.



Replacing the tube fitting

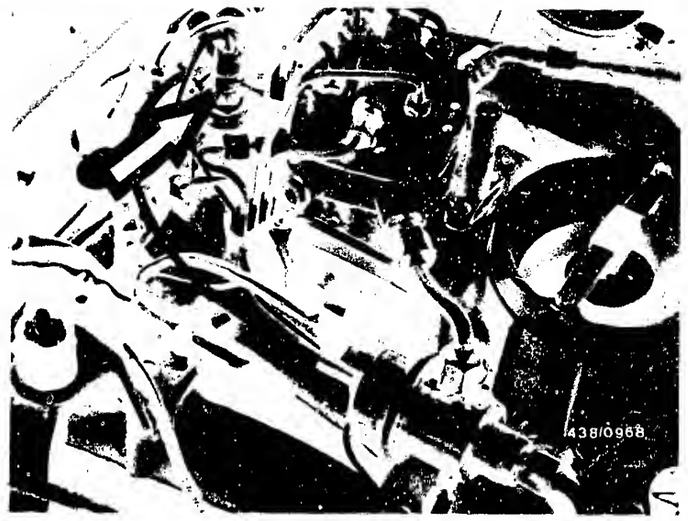
Pinch off the suction hose of the electric fuel pump once again.

Unscrew from the fuel accumulator (1), the electric fuel pump (2), and the fuel filter (3), the pressure line that they share.
In so doing, hold the fixed hex in each case with a wrench. Unscrew the tube fitting, and screw on the new tube fitting using a tightening torque of 10 ... 16 Nm. Put the pressure line back on. In so doing, use new seal rings for the tube fitting and the inlet union.

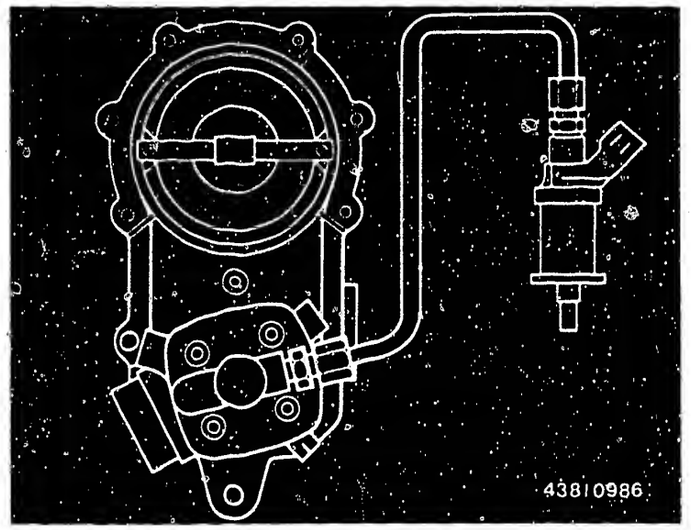


- The start valve leaks:

  Take the start valve out to check it. To release the fuel line, hold the hex of the double threaded fitting with a wrench. Likewise unscrew the fuel line to the start valve on the fuel distributor (center connection).



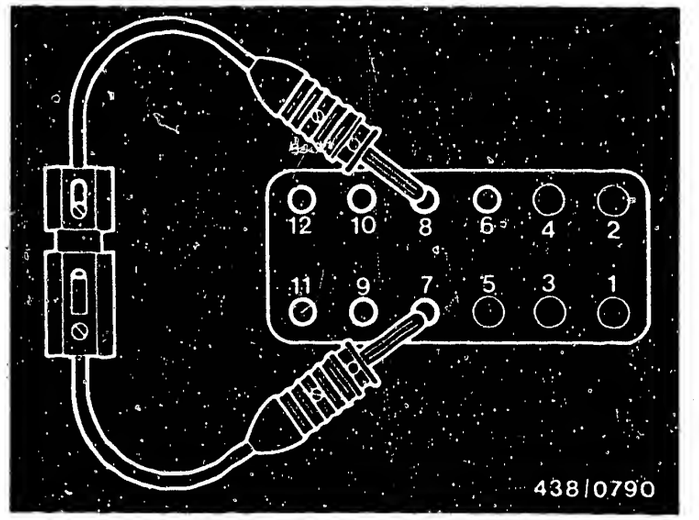
Connect the start valve directly to the start valve connection on the fuel distributor using a separate hose with a tapered connection M 10 x 1.



Turn on the electric fuel pump by bridging the electric safety circuit. To do this, bridge sockets 7 and 8 in the relay base.

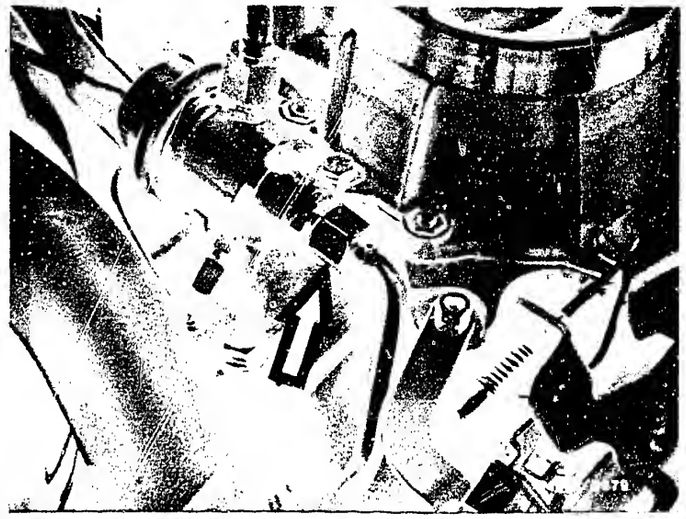
It is not permissible for any drops to drip from the start valve within the next minute. The valve must not leak even when shaken or pounded.

If it has been necessary to replace the start valve because of leaks, re-check the idle adjustment and, if need be, correct it. Idle adjustment is described on Coordinates G 19.



- The diaphragm-type pressure regulator for primary pressure is leaking.

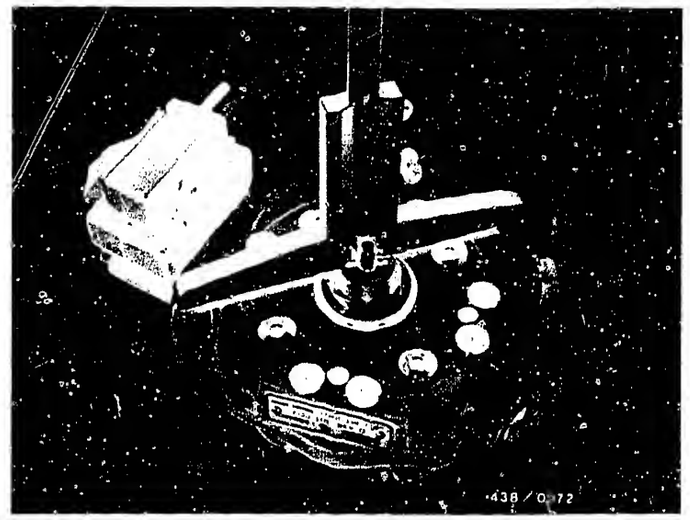
  To check this, unscrew the return connection (arrow) on the pressure regulator, and seal it tightly. If the leak has now been eliminated, take out and replace the pressure regulator.



- The seal ring for the lower plunger seal in the fuel distributor is leaking.

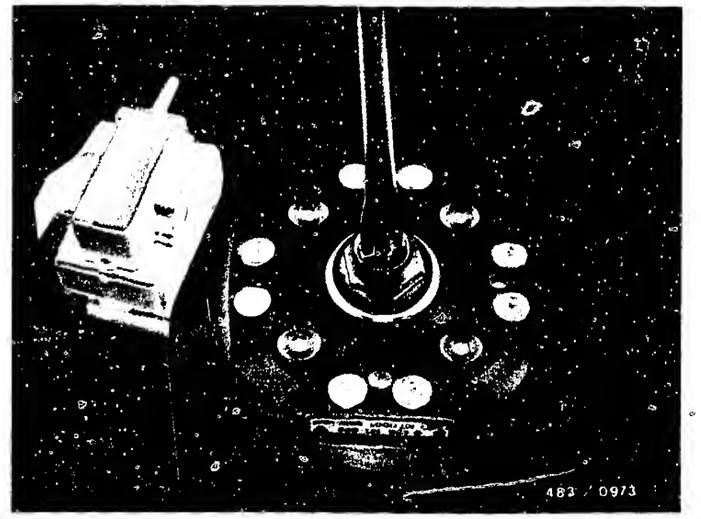
  Clean the fuel distributor, unscrew all fuel connections on the fuel distributor, and remove the fuel distributor from the air-flow sensor.

  Using a depth gauge, measure the position of the slotted round nut for the plunger seal with respect to the fastening nut for the barrel with metering slits, and note it down for later installation. In addition, mark the rotary position of the slotted round nut.



Screw out the slotted round nut using a shoulder screwdriver.

Carefully take out and replace the special gasket for the slotted round nut (do not damage it). Screw the slotted round nut back in until reaching the position determined on removal, and turn it to the rotary position as marked. Put the fuel distributor back on the air-flow sensor. In so doing, put in a new seal ring between the air-flow sensor and the fuel distributor. Maintain exactly a tightening torque of 3.2 ... 3.8 Nm for the fuel distributor fastening screws.



Checking the adjustment of the lower plunger seal (slotted round nut):

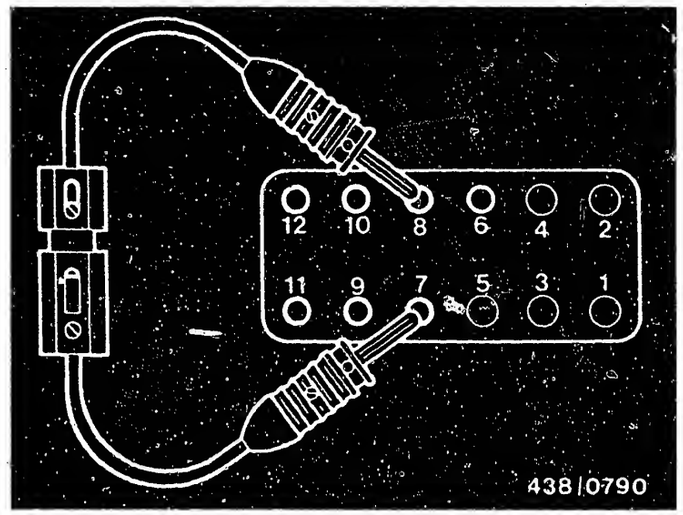
Turn the electric fuel pump on for a few seconds by bridging the electric safety circuit, so that the control plunger is put under pressure. To do this, bridge sockets 7 and 8 in the relay base.

When the adjustment of the air-flow sensor plate is correct, it is not permissible for the control plunger to touch against the needle-roller bearing in the sensor-plate intermediate lever. To check this, press the air-flow sensor plate down lightly. The air-flow sensor plate lever must have free travel between the zero position and the point of contact with the control plunger. This free travel is to amount to approx. 2 mm in the center of the air-flow sensor plate.

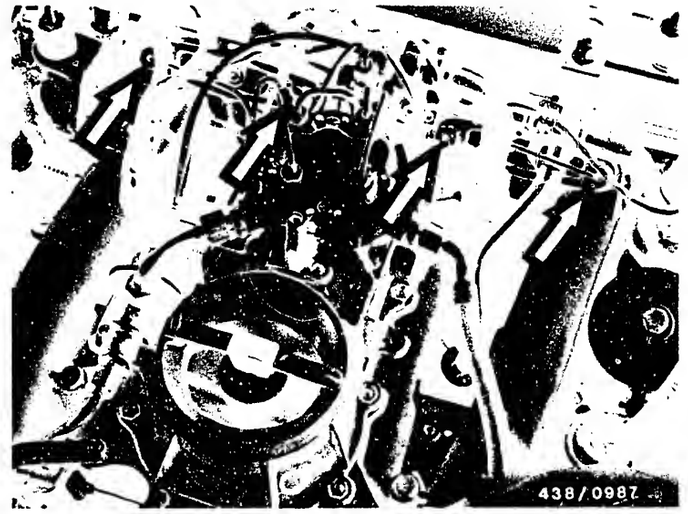
If this condition is not fulfilled, the fuel distributor must be taken off again and the position of the slotted round nut must be corrected accordingly.

If there is too little free travel, screw the slotted round nut further in, and vice-versa.

Changing the position of the plunger or the slotted round nut by 0.1 mm corresponds to approx. 0.7 mm in the center of the air-flow sensor plate.



15. Checking the injection valves



The injection valves have to be taken out to be checked. When releasing the injection lines, hold the fixed hex of the injection valves with a wrench. We also recommend releasing the injection lines on the fuel distributor somewhat. It is not permissible to crimp the steel injection tubes.

When the injection valves are being put back in, whenever possible replace the special gaskets on the valve stem (Daimler-Benz parts) in order to avoid leaking and, with that, the entry of unmetered air.

15.1 Test equipment and testing agent

The test specification below is for valve tester KDJE-P 400 (formerly KDEP 7452) and 0 681 200 700.

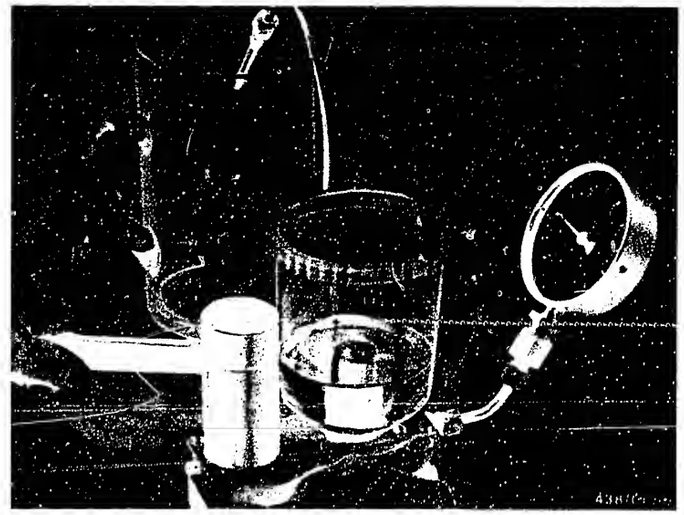
Observe the specification for testing agent!

Testing agent: Test gasoline.
Bosch order designation VS 14 942-CH, formerly part number 5 973 340 650
The test gasoline can be obtained in 5-liter drums from the following supplier:
Oskar Gnamm GmbH & Co
D-7531 Kämpfelbach-Bilfingen

N.B.:
Due to considerations of safety, it is never permissible to use ordinary driving gasoline or other similar highly flammable and combustible fluids.
Even when using test gasoline, be absolutely certain to follow local government regulations.

15.2 Connect the injection valves to the tester

Connect the injection valve to the valve tester and, with the union nut open, bleed the pressure line by operating the lever several times. Then tighten the union nut.



15.3 Testing for dirt

With the pressure gauge shut-off cock open, slowly operate the manual lever (about 2 sec. per stroke). If there is no build up in pressure to 1 ... 1.5 bar gauge pressure, the injection valve is leaking seriously (e.g., as a result of particles of dirt jammed in). An attempt can be made to flush the injection valve clean using repeated powerful operation of the lever.
If this succeeds, continue testing. If it is not possible to flush the valve clean, scrap the injection valve.

15.4 Checking the opening pressure

Injection valve	Test specification for opening pressure
0 437 502 010	3.0 ... 4.1 bar gauge pressure

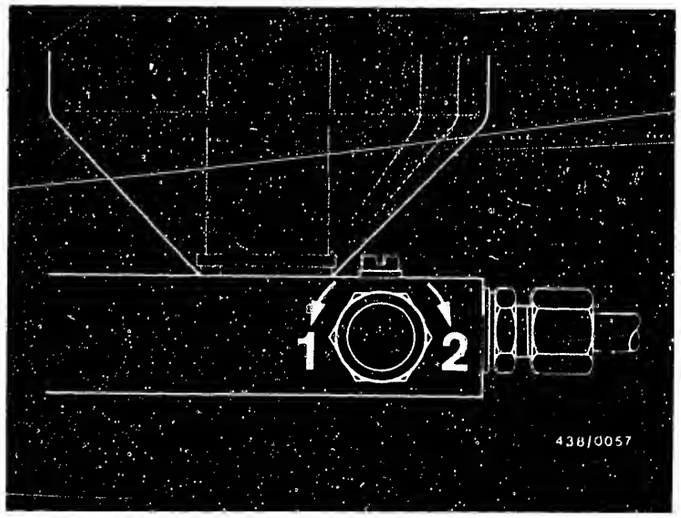
With the shut-off cock closed, flush out and bleed the valve by operating the lever several times.
Open the shut-off cock and check the opening pressure with a slow movement of the lever (about 2 sec./stroke).

If the opening pressure is not within tolerance, take out and replace the injection valve. It is also possible to replace individual injection valves within a set.

15.5 Testing for leaks

Open the shut-off cock and slowly increase the pressure to 0.5 bar less than the opening pressure as determined above. It is not permissible now for any drops to drip from the valve within the next 15 secs.

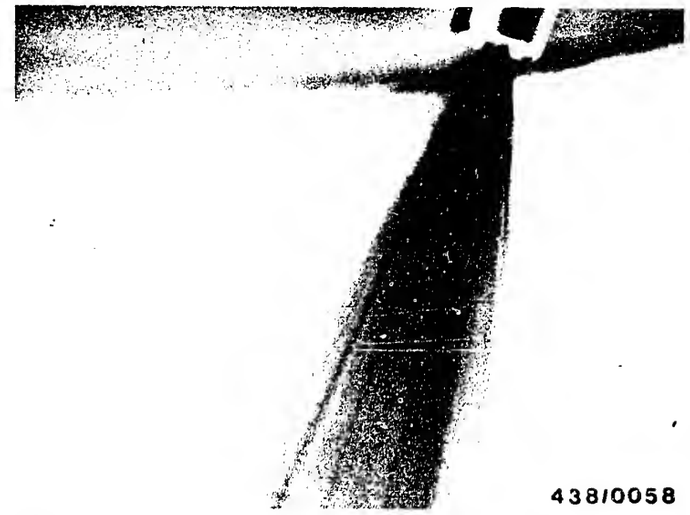
1 = Open 2 = Closed



15.6 Chatter test, evaluation of spray

Lever speed about 1 stroke/sec. The valve must chatter. It is not permissible for any drops to form at the mouth of the valve. The valve must not produce a "cord spray". Formation of a single-sided, atomized spray within an overall spray angle of approx. 35° is permissible. (See examples given in the illustrations.)

Illustration shows good spray formation.



438/0058

Illustration shows a spray formation that is one-sided, but good.

438/0059

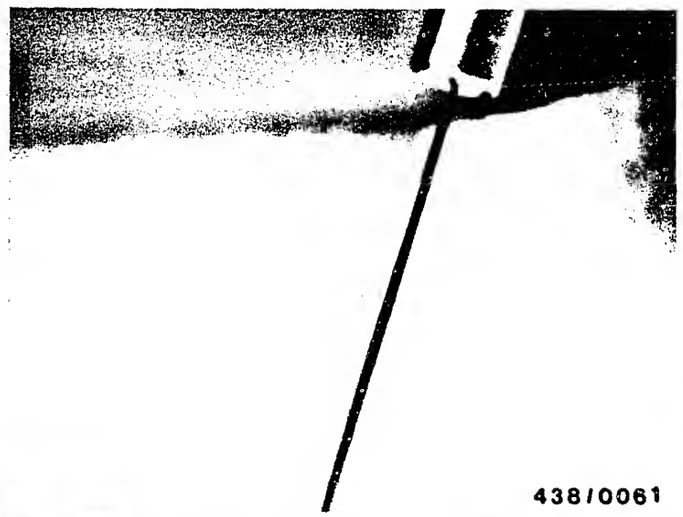
Poor spray formation. Scrap the injection valves.

Illustration shows formation of drops.

438/0060

Poor spray formation; scrap the injection valves.

Illustration shows "cord spray".



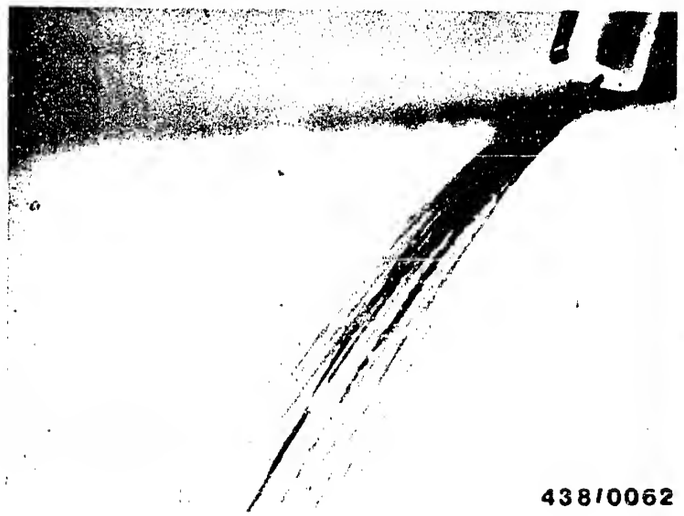
438/0061

Poor spray formation; scrap the injection valves.

Illustration shows "spray in strands".

If defective injection valves have been taken out and replaced, it is necessary to end by checking the idle adjustment with the engine at normal operating temperature.

Idle adjustment is described on Coordinates G 19.



438/0062

16. Comparative measurement of the fuel delivery from fuel distributor outlets

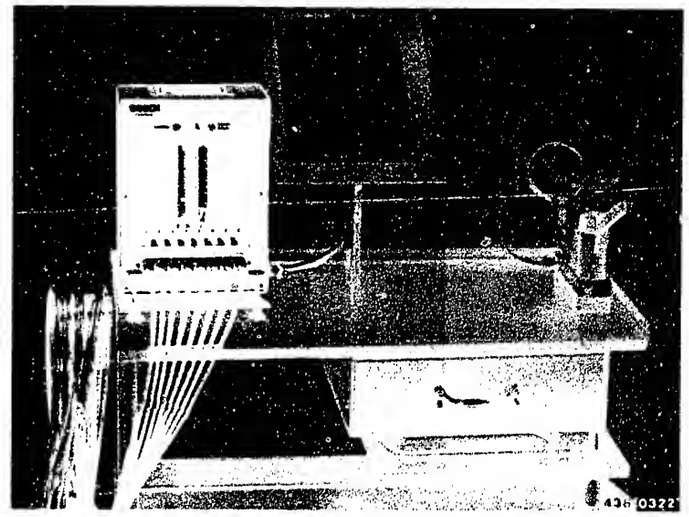
This test is performed using the tester for delivered quantity comparison, KDJE-P 200 (formerly KDJE 7451).

16.1 Application

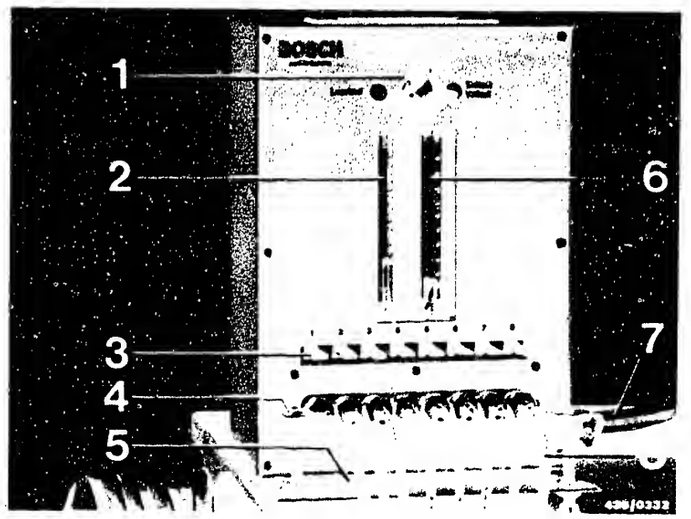
By means of comparative measurements, the differences in the amount of fuel delivered from the individual outlets on the fuel distributor are checked against one another. The tester is so designed that the test can be run on the vehicle without removing the fuel distributor.
Because this test is performed using the original injection valves, the operator can at the same time tell whether any delivered-quantity scatter that may occur is due to the fuel distributor or to the injection valves.

16.2 Construction

This tester is designed for all engines up to and including 8-cylinder engines.



1 = 3-way cock
2 = Small rotameter tube
3 = Keyboard for 8-way valve
4 = Adjusting screw for setting up
5 = Spirit level
6 = Large rotameter tube
7 = Fuel return hose
8 = Polyamide hose lines (test lines)



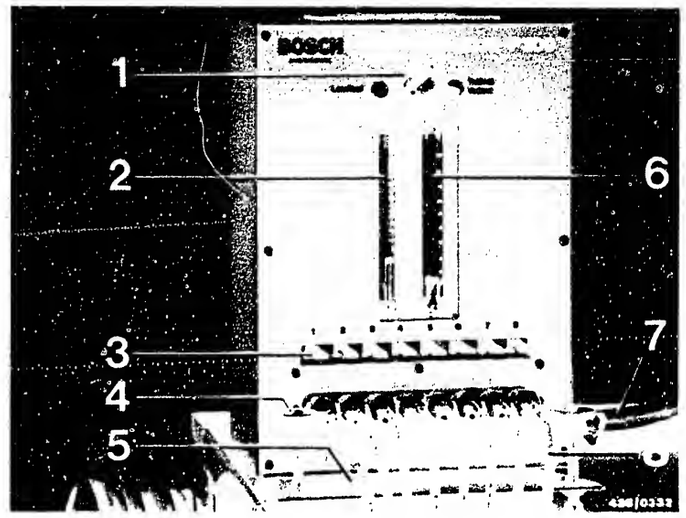
Inside a sheet steel housing, there are installed 2 rotameter tubes, with ranges 2 ... 15 cm^3/min. and 10 ... 180 cm^3/min., and 8-way valve for key operation (3) and a 3-way stopcock (1).

The small rotameter tube (2) is used for the idle measurement, while the large rotameter tube (6) is used to measure the delivery at part load and at full load. The rotameter tube needed in each case is connected using the 3-way stopcock. The 8-way valve is used to check the fuel delivery of each cylinder, one after the other.

The injection valves are pulled out from their mounts on the engine and inserted into the automatic connectors at the end of the 8 hoses (8) attached to the tester. Each automatic connector is fitted with a push valve so that no fuel can escape from hoses that are not in use (when 4- or 6-cylinder systems are being tested).

The fuel is returned to the fuel tank through a hose (7) about 5 m long.

The entire test is performed with a closed circuit, i.e., no fuel escapes.

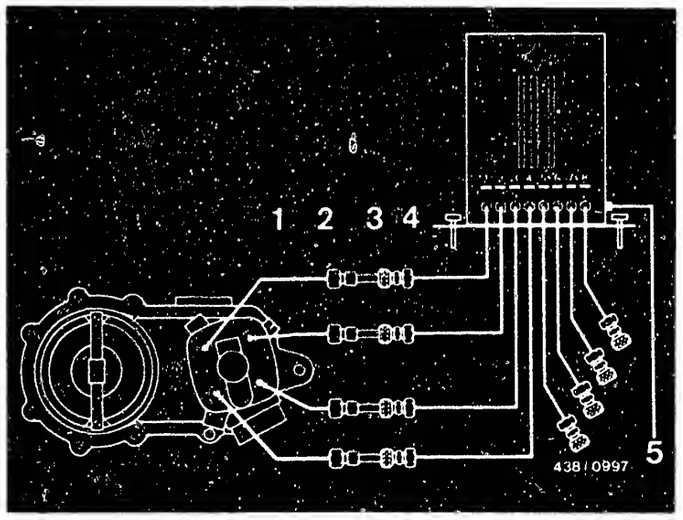


1 = Adapter lines from line set KDJE-P 200/25.
2 = Injection valves
3 = Automatic connectors
4 = Tester hoses
5 = Return line to fuel tank filler neck

16.3 Setting up and connecting the tester for delivered quantity comparison

Set the tester up next to the vehicle on a solid base (e.g., on mobile stand KDJE-W 100) and align it using the spirit level attached (water level at the base of the tester).

In order not to crimp the rigid injection lines too severely, adapter lines KDJE-P 200/25 are to be used to connect the tester for delivered quantity comparison.



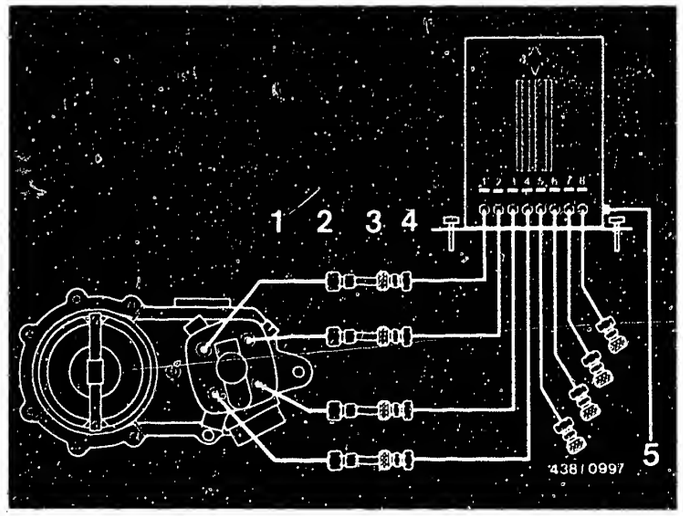
To test, take out the injection valves. When releasing them, hold the fixed hex of the injection valves with a wrench. Also unscrew the injection line from the fuel distributor. It is not permissible to crimp the steel injection lines.

When putting the injection valves back in, the special gaskets on the valve stem should, wherever possible, be replaced (Daimler-Benz parts) in order to prevent leaks and with that to prevent the entry of unmetered air.

1 = Adapter line from line set KDJE-P 200/25
2 = Injection valves
3 = Automatic connectors
4 = Tester hoses
5 = Fuel return line to the fuel tank filler neck

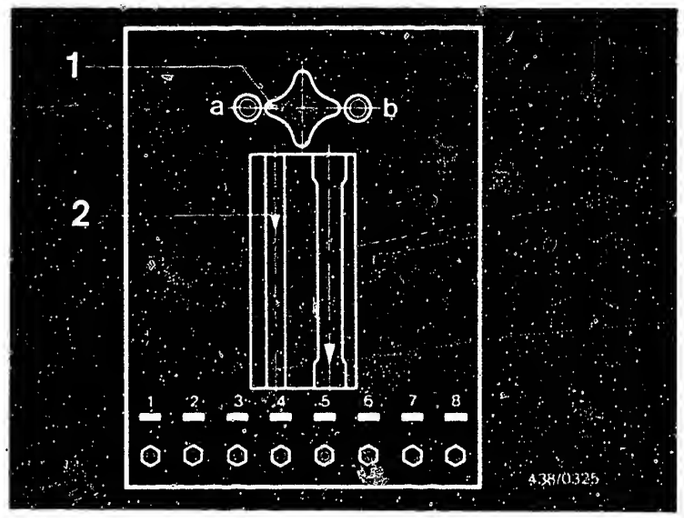
Connect the injection valves to the adapter lines.
Clean the injection valves with a rag and insert them into the automatic connectors on the tester hoses.

Note:
Insert the injection valves firmly until reaching the stop, and tighten the knurled nut securely so that the non-return valves on the automatic connectors are completely open.
Insert the return hose from the tester into the filler neck on the fuel tank.



16.4 Bleeding the tester

Turn the electric fuel pump on by bridging the electric safety circuit.
Press the air-flow sensor plate through until reaching the stop. Press the buttons on the 8-way valve one after the other. In so doing, shift over the 3-way stop-cock several times, until both rotameter tubes have been bled.
Bring the air-flow sensor plate back into the rest position.



1 = White dot
2 = Measuring line
a = Idle
b = Part load/full load

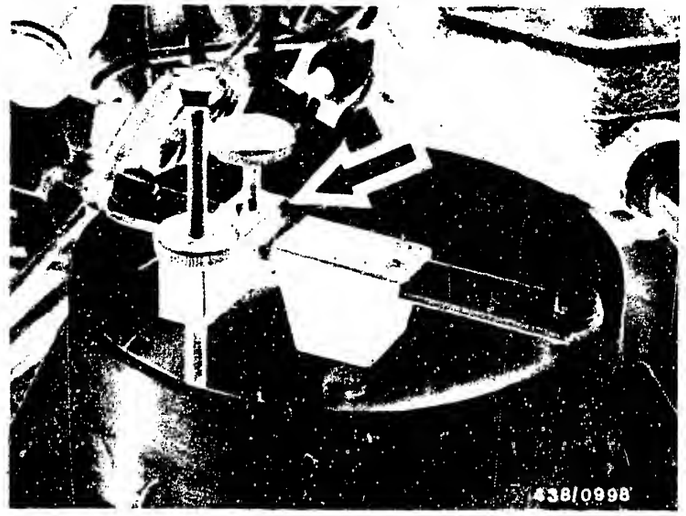
16.5 Testing

The comparative measurement of fuel delivery is done at idle, under part load, and under full load. Measurement at idle using the small rotameter tube (white dot at the left on the control knob), measurement at part load and at full load using the large rotameter tube (white dot at the right).

The reading for fuel delivery is taken on the rotameter tubes at the upper edge of the conical float (Item 2). On testers with a ball float, use the uppermost point of the ball for the reading. For each measurement, make sure to wait until the float has reached its final position. Where the fuel deliveries are small, that can take from 20 to 30 seconds.

Adjusting device KDJE 7456 is used to make the exact adjustment and location of the air-flow sensor plate position for the various load ranges.

This is clamped firmly to the stop bracket of the air funnel with the adjusting screw at first turned all the way back (arrow).
The position of the air-flow sensor plate is adjusted using the adjusting screw.

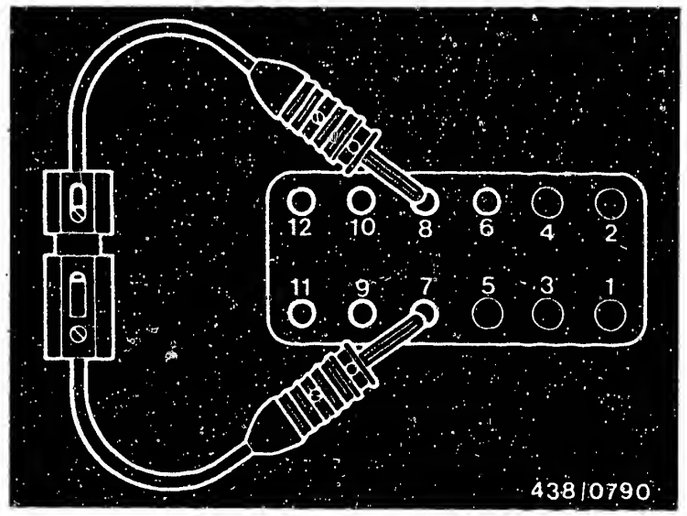


Procedure:

Turn the electric fuel pump on by bridging the safety circuit. Remove the plug on the electrohydraulic pressure actuator.

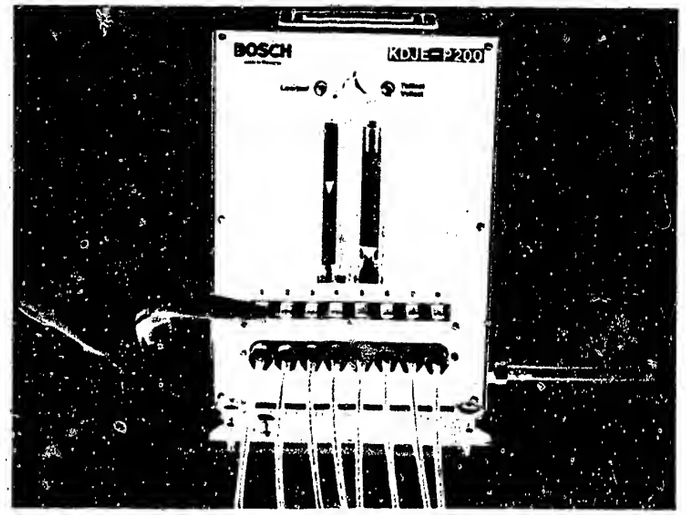
For the individual load ranges, we have indicated below fixed numerical values for the maximum permissible differences in fuel deliveries.

The "setting point" value always pertains to the fuel distributor outlet with the least fuel delivery, i.e., always find first the outlet with the least fuel delivery.



Test specifications:

Load range	Setting point	Maximum permissible fuel delivery
Idle:	6.0 cm^3/min	6.6 cm^3/min
Part load:	40.0 cm^3/min	42.5 cm^3/min
Full load:	100.0 cm^3/min	109.0 cm^3/min
Full load with max. deflection of the air-flow sensor plate. Min. delivery from all outlets:	140.0 cm^3/min	----------



Press button for outlet 1. Deflect the air-flow sensor plate until the corresponding rotameter tube indicates approximately the values shown as the "setting point". Fix the air-flow sensor plate in position.

Check the rest of the outlets, in order to ascertain the outlet with the least fuel delivery.

Press the button for this outlet once again and adjust the delivery exactly to the "setting point" by correcting the position of the air-flow sensor plate. Lock the air-flow sensor plate in position once again.

Press the other buttons one after the other, and ascertain the maximum fuel delivery from each outlet. The only deviations in fuel delivery that can occur will be over and above the setting point.

If the test shows too great a deviation in one of the three load ranges, repeat the test in order to be certain.

If the results are confirmed, check whether the cause lies with the fuel distributor or with the injection valves.

To do this, interchange the injection valves with the greatest and with the least deviations one for the other.

If the results remain unchanged, the fault lies with the fuel distributor. If the error follows the injection valves, the fault lies with the injection valves.

Take out and replace a defective fuel distributor or defective injection valves.

16.6 Finishing off

Check the special gaskets on the injection valve stems for damage, and replace damaged gaskets (Daimler-Benz parts).

Remount the injection valves and reconnect all fuel lines. In so doing make certain that all fuel lines are laid correctly.

Reconnect the electric safety circuit (Put on the relay). Reconnect the plug to the electrohydraulic pressure actuator. In a test run, make certain that no line connections leak.

Finally, recheck the idle adjustment, and, if need be, correct it. Idle adjustment is described on Coordinates G 19.

17. Testing the correction functions using the universal test adapter ETT 018.01 - 0 684 101 801, the KE-Jetronic test lead 1 684 463 135, and a commercially available multimeter

17.1 Instructions for the trouble-shooting program below

This program has been organized into three series of boxes: The boxes in the column to the left present the best sequence of test steps. At the same time, each box contains all the instructions needed on operation of the universal test adapter and tester, on test conditions, on test procedure, and on test specifications.

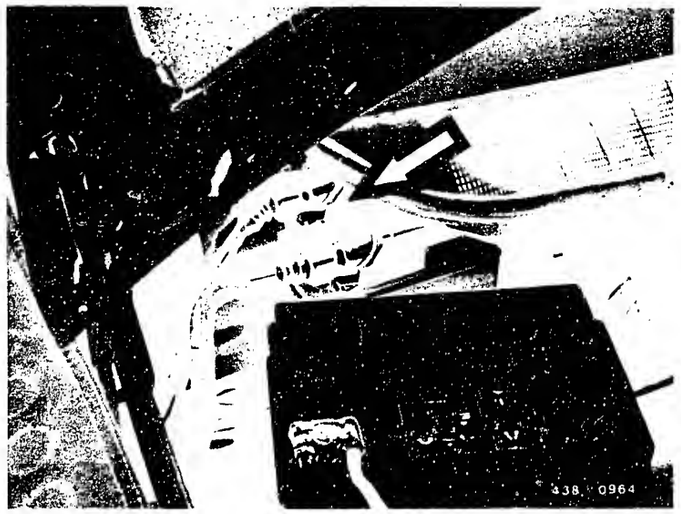
The column in the middle shows the instructions necessary for each test step for trouble-shooting and correction.

The column at the right provides - where necessary - supplementary instructions in the form of illustrations or diagrams.

This sequence of test steps presents the most advantageous procedure. Always carry through the entire program since the individual test steps build upon one another. Shifting over to the series of boxes in the center is necessary only when the required test specifications and functions are not obtained in a given test step.

17.2 Connecting the universal test adapter:

Note:
In vehicles with ABS, remove the ABS control unit before taking out the KE-control unit. (Open the clamper, and remove the control unit from the mounting with the multiple plug attached.
Push the KE-control unit (arrow) upward in the mounting and take it out.



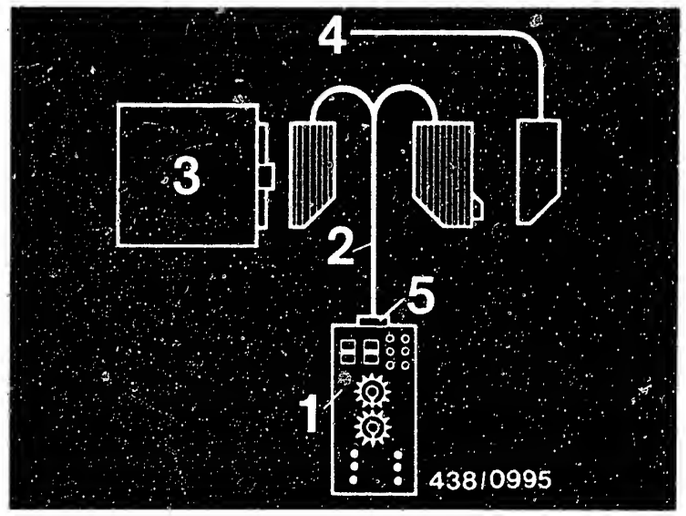
1 = Universal test adapter
2 = System-adapter lead
3 = Control unit
4 = System-wiring harness
5 = Pin terminal

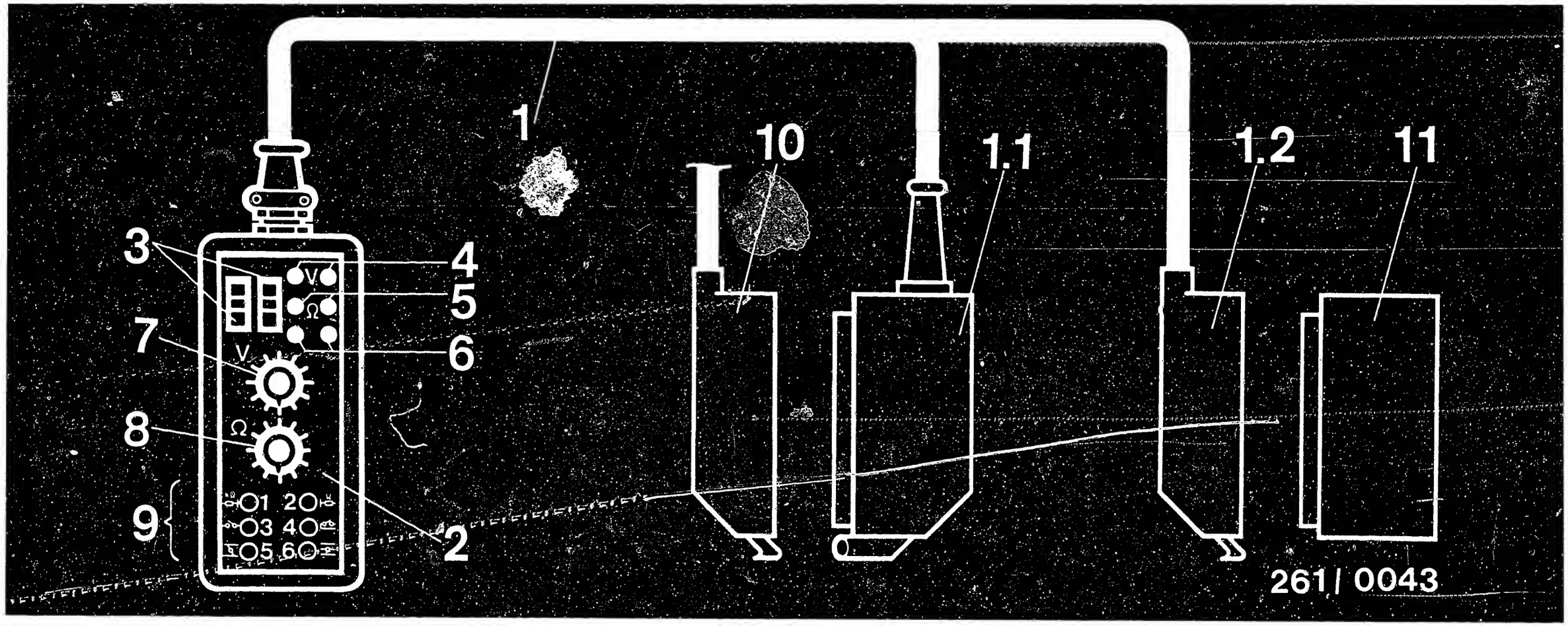
Remove the multiple plug on the control unit (Push back the detent, and hinge the plug up on the detent side first). Connect the power plug to the edge connector on the test lead of the universal test adapter.

The multiple plug of the test lead is meant to make connection to the control unit. However, this connection must not be made except for certain tests in the test chart that follows. On this point, follow the appropriate instructions in each test step.

Important note: Make certain that the ignition is turned off whenever plugging into the control unit.

Connect the multimeter (e.g., Miselco Master 50 K) according to instructions from the manufacturer to the test sockets of the universal test adapter provided for the measurements in question (V, Ω, 1-2 for current measurements).





17.3 Construction and use of the universal test adapter

1 = Test lead for the KE-Jetronic 1 684 463 135
1.1 = Connection to the wiring harness
1.2 = Connection to the control unit
2 = Universal test adapter ETT 018.01 - 0 684 101 801
3 = Test wells for motortester (not used for the KE-Jetronic)
4 = Test sockets for measuring voltage
5 = Test sockets for measuring resistance
6 = Test sockets for measuring current
7 = Program switch "V"
8 = Program switch "Ω"
9 = Buttons to simulate operating conditions
Button 1 = simulation of "cold" engine (-20° C)
Button 2 = simulation of "warm" engine (approx. +80° C)
Button 3 = not used for KE-Jetronic
Button 4 = simulation of "starting motor operation"
Button 5 = simulation of "idle" throttle valve switch
Button 6 = simulation of "full load" throttle valve switch
10 = Multiple plug KE-Jetronic wiring harness
11 = Control unit

17.4 Test chart for the universal test adapter

Test 1:

Internal resistance of pressure actuator.

Disconnect plug on the control unit.
Switch settings:

V	Ω	Button
	4	-

Test specifications: 21 ... 25 Ω
Test specification reached?

no →

If resistance is ∞ Ω:

1. Check leads 10 and 12 from the multiple plug to the pressure actuator for a break.

2. Pressure actuator defective. Take out and replace pressure actuator.

If resistance is not within tolerance:

Pressure actuator defective; take out and replace pressure actuator.

Replacing the pressure actuator:

Clean areas of fuel distributor near the pressure actuator.

Remove plug and unscrew pressure actuator from fuel distributor.

The new pressure actuator is supplied as a complete set of parts, with the proper seal rings and fastening screws.

As a rule, mount the new pressure actuator using the new seal rings and the original fastening screws (non-magnetic steel).

yes ↓

Test 2:

Internal resistance of temperature sensor.

Plug on the control unit disconnected.
Switch settings:

V	Ω	Button
	5	-

Test specifications:
+15°...30°C: 1.3...3.6kΩ
approx. +80°C: 250...390 Ω
Test specification reached?

no →

If resistance is ∞ Ω:

Check lead 21 from the multiple plug to the temperature sensor for a break.

If resistance is not within tolerance:

Temperature sensor is defective. Take out and replace temperature sensor.

yes ↓

Continued on F8/F9

Test 3:
Ground, control unit - output stage

Plug on control unit disconnected.
Switch settings:

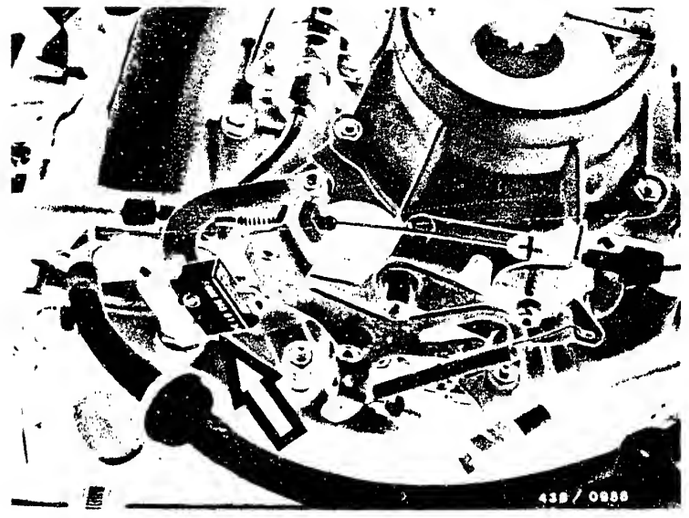
V	Ω	Button
↓	11	-

Test specification: 0...10 Ω

no →

Result of measurement ∞ Ω:

Check leads 2 and 20 from the multiple plug to ground for a break. Eliminate any break.



yes ↓

Test 4:

"Idle" throttle valve switch

Plug on control unit disconnected.
Switch settings:

V	Ω	Button
↓	9	-

N.B.: Measurement of voltage; connections for voltmeter:

Neg. = black socket "V"
Pos. = blue socket on left "Ω"

Turn on ignition.
Test specification:
1. Throttle valve closed:
   8 ... 15 V
2. Throttle valve open:
   0 V
3. Switch-over point for switch within linkage free travel, before throttle valve moves.

no →

Check switch operation directly on throttle valve switch using ohmmeter. Take out and replace defective throttle valve switch (Daimler-Benz part)

If switch is operating OK, but there is no voltage reading with the throttle valve closed, check the following leads:

1. Positive power supply from the "full load" throttle valve switch to the "idle" throttle valve switch.
2. Lead from terminal 87 on the over-voltage protection relay (attached next to the control unit) to the "full load" throttle valve switch.
3. Lead 13 from the multiple plug to the "idle" throttle valve switch.

Eliminate any breaks.

yes ↓

Continued on F10/F11

Test 5: —

"Full load" throttle valve switch

Plug on the control unit disconnected.
Switch settings:

V	Ω	Button
↓	10	-

N.B.: Measurement of voltage.
Connections for voltmeter:

Neg.: black socket "V"
Pos.: blue socket on left "Ω"

Turn on ignition.
Test specification:
Throttle valve switch closed:
0 V
Throttle valve switch fully open:
8 ... 15 V

no →

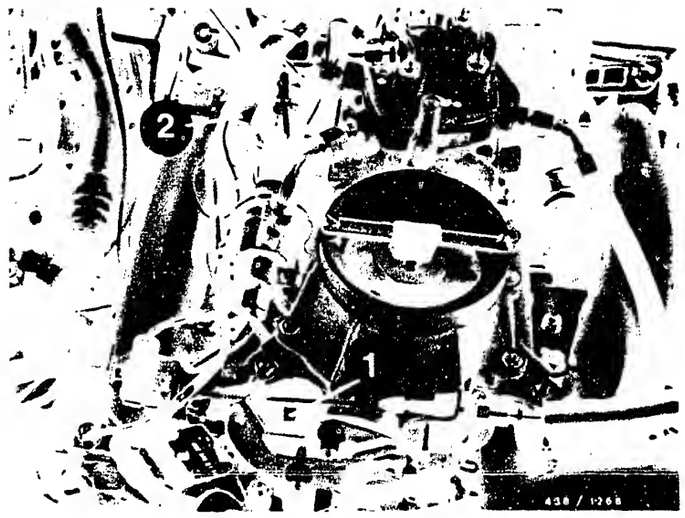
Check switch operation directly on the throttle valve switch (1) using ohmmeter.

Note: Connecting lead for the throttle valve switch can be taken apart at a cable-to-cable double connector (2).

Take out and replace defective throttle valve switch (Daimler-Benz part).

If the switch is operating properly but there is no voltage reading with the throttle valve fully open, check the following leads:

1. Lead from terminal 87 on the over-voltage protection relay (attached next to the control unit) to the "full load" throttle valve switch.
2. Lead 5 from the multiple plug to the "full load" throttle valve switch.



yes ↓

Test 6:

Starting signal terminal 50 Ignition/starting switch (only with automatic transmissions)

Plug on control unit disconnected:
Switch settings:

V	Ω	Button
3	-	-

Turn starting motor on briefly.
Test specification: 8 ... 15 V

no →

Check lead 16 from the multiple plug to the ignition/starting switch for a break.
Eliminate any break.

yes ↓

Continued on F12/F13

Test 7:

Starting signal terminal 50-starting motor

Plug on the control unit disconnected.

Switch settings:

V	Ω	Button
4	-	-

Operate starting motor briefly.
Test specification: 8 ... 15 V

no → Check lead 24 from the multiple plug to the starting motor for a break.

Eliminate any break.

yes ↓

Test 8:

TD-signal (ignition signal)

Plug on the control unit disconnected.

Switch settings:

V	Ω	Button
5	-	-

Operate the starting motor for a few seconds.
Test specification: no defined test specification has been prescribed. It is sufficient to ascertain that the signal is being received. Depending upon the voltmeter model, a reading of about 5 V is shown.

no → Check the lead running from terminal 1 of the ignition trigger box via the lead connector of the diagnostic socket, and via terminal TD on the electric fuel pump relay socket to terminal 25 on the multiple plug for a break.

Eliminate any break.

yes ↓

Continued on F14/F15

Test 9:

Voltage supply for control unit

Plug on the control unit disconnected.
Switch settings:

V	Ω	Button
9	-	-

Turn on ignition.
Test specification: 8 ... 15 V

no

Check operation and energizing of the over-voltage protection relay (mounted on the left next to the control unit). (Terminal 30, terminal 15-86, ground terminal 85, terminal 87).

If OK, check the lead from terminal 87 on the over-voltage relay to terminal 1 on the multiple plug for a break.

Eliminate any break.

yes

Test 10:

Voltage supply
Potentiometer in the air-flow sensor and pressure sensor (altitude sensor)

Connect the control unit.

Switch settings:

V	Ω	Button
7	-	-

Turn on the ignition.
Test specification: 7 ... 8 V

no

No reading or incorrect reading:

Control unit defective.

Take out and replace control unit.

yes

Continued on F16/F17

Test 11:

Signal from the potentiometer on the air-flow sensor

Control unit connected.

Switch settings:

V	Ω	Button
8	-	-

Turn on the ignition.

1. Air-flow sensor plate in zero position: 0 V

2. Air-flow sensor plate in basic position (diagram at top): 0.2 ... 0.3 V.

3. Deflect air-flow sensor plate by hand: voltage rise to max. 8 V.

yes

no

1. No signal in any of the 3 test points:

Check leads 14 (-) and 17 (wiper voltage) from the multiple plug to the potentiometer for a break. If not due to a break check the potentiometer directly on the connection pins for an open circuit, using an ohmmeter.

Take out and replace a defective potentiometer (see 3.).

2. Incorrect values in all 3 test points:

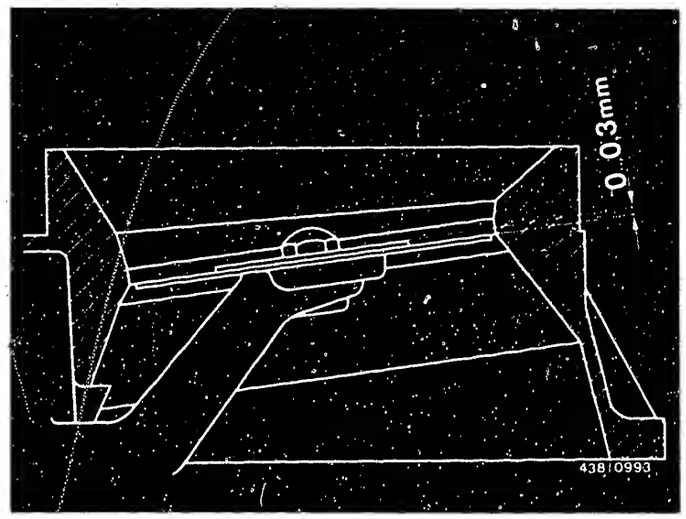
Adjust the potentiometer (see 3.). If adjustment is impossible, take out, replace, and adjust the new potentiometer.

3. Taking out, replacing, and adjusting the potentiometer

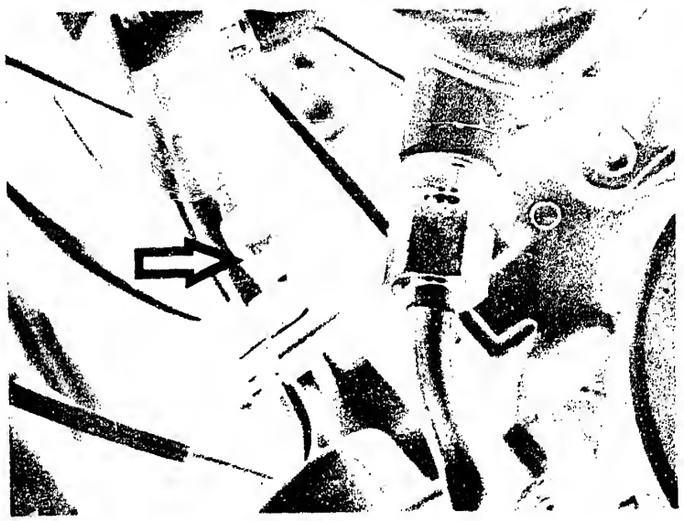
Scratch off the sealant on the 4 fastening screws and unscrew the potentiometer housing assembly.

Important note: The sensitive potentiometer wiper must not be touched. It has been adjusted in the factory (position, contact force) and cannot be corrected or taken out and replaced.

Carefully screw the new potentiometer housing on, using a new gasket. Tighten down only lightly.



Arrow = potentiometer



Continued on F18/F19

Test 12:

Idle actuator power supply and continuity coil 1

Disconnect plug on control unit.

Switch settings:

V	Ω	Button
10	-	-

Turn on ignition.

Test specification: 8 ... 15 V

yes

Continued on F20/F21

no

No reading:

1. Check lead from terminal 87 on the over-voltage protection relay to terminal 2 of the idle actuator (arrow).

2. Check lead from terminal 3 of the idle acuator to connection 3 on the multiple plug. Eliminate any break.

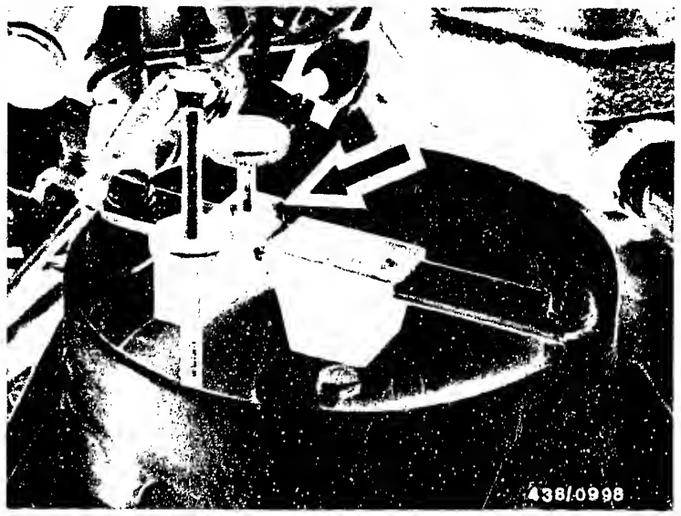
3. Using an ohmmeter directly on connections 2 and 3 of the idle actuator, check coil 1 for continuity. If there is an open circuit, take out and replace the idle actuator.

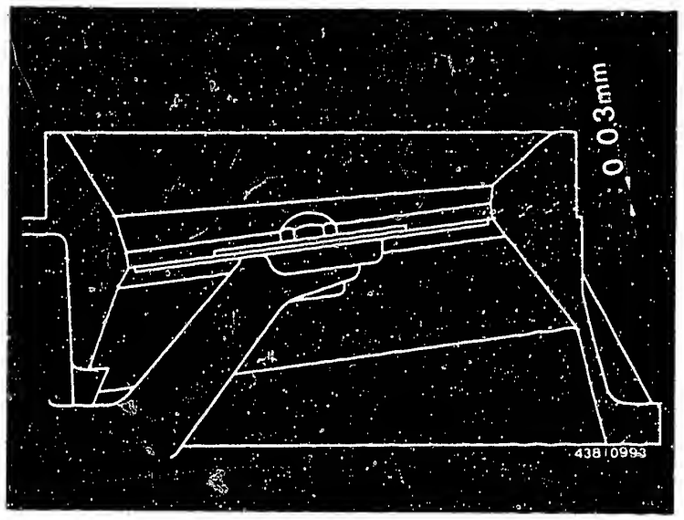
Adjusting the potentiometer:

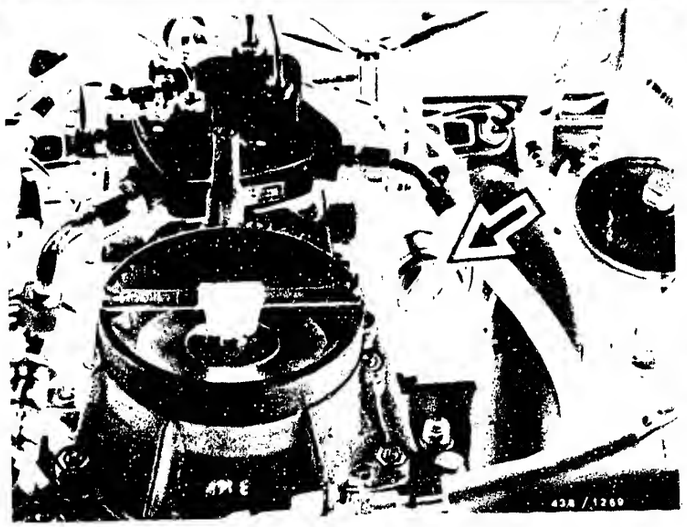
Using adjusting tool KDJE 7456, fix the air-flow sensor plate in its basic position. Definition: upper edge of the sensor plate flush with the junction edge from the cylindrical area to the air funnel. Evaluated visually on the outside of the air-flow sensor.

Turn the potentiometer in the area near the slots until a reading of 0.2 ... 0.3 V is attained.

Tighten the fastening screws with a tightening torque 5 ... 5.5 Nm and secure, using a black sealing agent (e.g., Terroson).







Test 13:

Idle actuator - continuity coil 2

Plug on control unit disconnected.

Switch settings:

V	Ω	Button
11	-	-

Turn on ignition.

Test specification: 8 ... 15 V

no

No reading:

1. Check lead from terminal 1 on the idle actuator to connection 4 on the multiple plug. Eliminate any break.

2. Using an ohmmeter directly on connections 1 and 2 of the idle actuator, check coil 2 for continuity. If there is an open circuit, take out and replace the idle actuator.

yes

Test 14:

Air conditioner signal

Plug on control unit disconnected.

Switch settings:

V	Ω	Button
12	-	-

Turn on ignition.

Turn on air conditioner.

Test specification: 8 ... 15 V

no

No reading:

Check lead 19 from the multiple plug to the air conditioner switch (instrument panel) for a break.

Eliminate any break.

yes

Continued on F22/F23

Test 15:

Signal-potentiometer of the pressure sensor (altitude sensor)

Connect control unit.

Switch settings:

V	Ω	Button
13	-	-

Connect a vacuum pump (e.g., Mityvac hand pump) to the tail-piece of the pressure sensor (mounted on the left next to the control unit).

Turn on the ignition.

Testing and test specifications:

Wiper voltage depending on air pressure:
Sea level: 6 ... 7 V
When vacuum pump is operating, drop in voltage.
At 400 mbar: 1 ... 2 V.

no →

No reading:

Possible break in the following leads:

1. Connection 18 from multiple plug to terminal 2 of the pressure sensor.

2. Connection 11 of the multiple plug to terminal 1 of the pressure sensor.

Incorrect reading:

1. Possible break in lead 14 from the multiple plug to terminal 3 of the pressure sensor.

2. Pressure sensor defective. Take out and replace the pressure sensor.

yes

Continued on G1/G2

Test 16:

Lambda closed-loop control operation

Control unit connected.

Switch settings:

V	Ω	Button
14	24	-

Bridge sockets 1 and 2 on test adapter.

Start engine and warm it up.

Test specification:
Closed-loop control operation:
pulsing reading for voltage.
Average value approx. 3 V.

no →

yes ↓

1. No voltage reading:

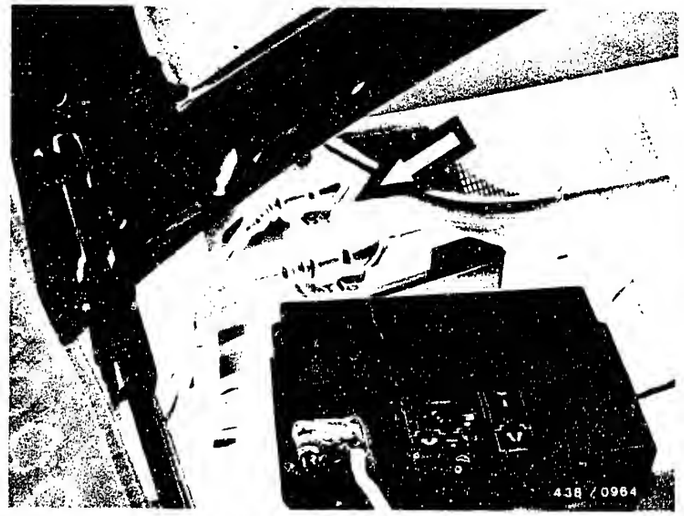
Control unit defective. Take out and replace control unit (arrow, top diagram).

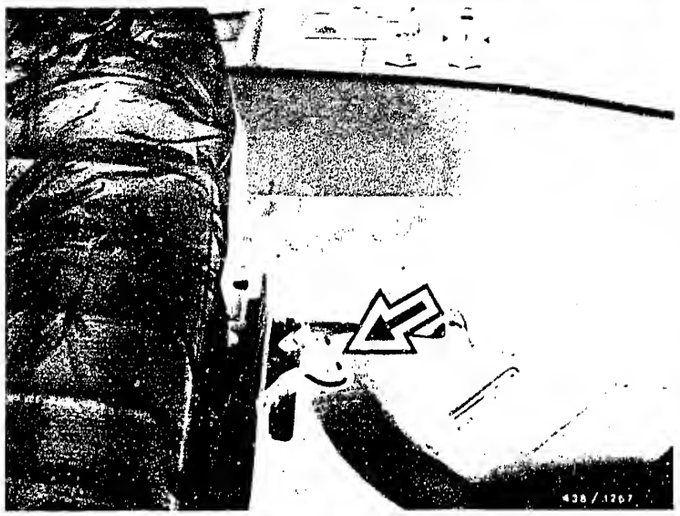
2. Steady voltage reading of approx. 3 V instead of pulsing reading:
2.1 Take apart lambda sensor lead at the plug connector under the carpeting in front of the front passenger's seat (arrow, middle diagram) and ground the lead on the control unit end. Voltage reading rises.
Possible causes if there is no reaction:
Break in sensor lead to connection 8 on the multiple plug.

Control unit defective. Take out and replace control unit.

2.2 If voltage rises with sensor lead shorted to ground:
Lambda sensor defective (arrow, bottom diagram):
Take out and replace lambda sensor.

Before putting in a new sensor, brush its thread with special mounting paste VS 14 016 Ft (5 964 080 105). Brush only threads. It is not permissible to have paste get into the slots.





Test 17:

Warm-up enrichment - -20° C

Control unit connected.

Disconnect plug on the pressure sensor (altitude sensor).

Switch settings:

V	Ω	Button
-	-	1

Ammeter range: 0 ... 100 mA.
Turn on ignition.

Test specification: 63 ... 83 mA.

no →

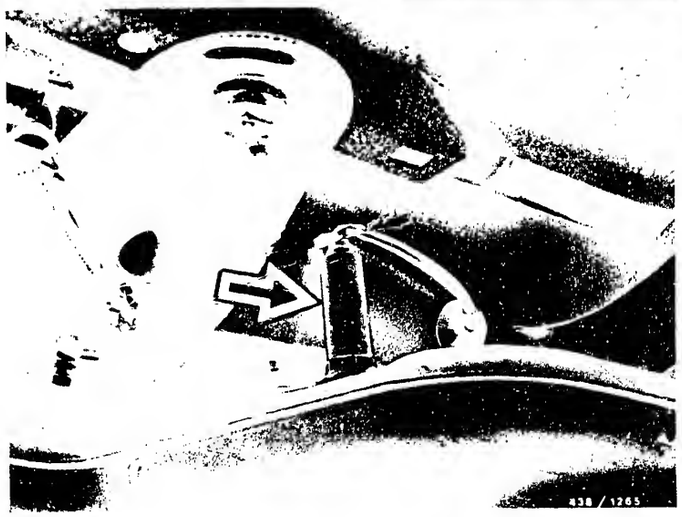
No reading, or incorrect reading:

Control unit defective.

Take out and replace control unit.

yes ↓

Continued on G3/G4



Test 18:

Shut-off for warm-up enrichment (actuator current with engine at normal operating temperature)
Control unit connected.
Plug on pressure sensor (altitude sensor) disconnected.
Switch settings:

V	Ω	Button
-	-	2

Ammeter range: 0 ... 100 mA.
Turn on ignition.

Test specification: 7 ... 9 mA.

no →

No reading, or incorrect reading:
Control unit defective.

Take out and replace control unit.

yes ↓

Test 19:

Starting enrichment
Control unit connected.
Plug on pressure sensor (altitude sensor) disconnected.
Switch settings:

V	Ω	Button
-	-	2/4

Ammeter range: 0 ... 100 mA.
Turn on ignition.
Test: Keep button 2 pressed down.
Press button 4: current increases to 48 ... 68 mA.
Shut-off: approx. 1 sec.

no →

No reading, or incorrect reading:
Control unit defective.

Take out and replace control unit.

yes ↓

Continued on G5/G6

Test 20:

Post-start enrichment

Control unit connected.

Plug on pressure sensor (altitude sensor) disconnected.

Switch settings:

V	Ω	Button
-	-	1/4

Ammeter range: 0 ... 300 mA.

Turn on ignition.

Test specifications: Keep button 1 pressed down: 63 ... 83 mA.
Press button 4: rise to: 105 ... 140 mA.
After a short while, cut-back to: 63 ... 83 mA.
Cut-back time:
approx. 90 seconds.

no →

Incorrect reading or behavior:

Control unit defective.

Take out and replace control unit.

yes ↓

Continued on G7/G8

Test 21:

Acceleration enrichment:

Control unit connected.

Switch settings:

V	Ω	Button
-	-	1/6

Ammeter range: 0 ... 300 mA.

Turn on ignition.

Test specifications: Press both buttons: 63 ... 83 mA.
Press air-flow sensor plate quickly.
Current increases briefly to: 130 ... 150 mA.
Cut-off time: about 1 second.

no

Incorrect reading or behavior:

Control unit defective.

Take out and replace control unit.

yes

Continued on G9/G10

Test 22/1:

Overrun cutoff
Control unit connected.

Switch settings:

V	Ω	Button
-	-	2

Switch terminals on ammeter (exchanging pos. and neg.)
Range: 0 ... 100 mA.
Test:
Start engine and hold at 1800 ... 2000 min^{-1}.

While pressing button 2, operate "idle" throttle valve switch by hand. Motor hunts.
Current during the dropping speed phase: 40 ... 50 mA.

no →

Incorrect reading or behavior:

Control unit defective.

Take out and replace control unit.

yes ↓

Test 22/2:

Supplementary test, vehicle with cruise control: suppression of the overrun cutoff

No operation of the overrun cut-off is permissible when the cruise control is turned on.

no →

Overrun cutoff not suppressed:

Note: The cruise control can be turned on only when the vehicle is moving.

With the cruise control turned on, there must be a negative signal at connection 6 on the multiple plug.

Check lead 6 to the control unit for the cruise control for a break.

Eliminate any break.

yes ↓

Continued on G11/G12

Test 23:

Lambda closed-loop control
Control unit connected.

Switch settings:

V	Ω	Button
14	24	see text

Connect ammeter in normal manner.
Range: 0 ... 30 mA.

Test: Start engine, warm it up, and operate at idle speed.

Closed-loop control operation of the lambda closed-loop control can be identified from the pulsing reading for current.
Average value: 7 ... 9 mA.

Disconnect plug on "full load" throttle valve switch and bridge on the control unit side. (Simulation of full load).

Control shifts from closed-loop to open-loop control operation. (Steady reading for current).
Specification depends on elevation. At sea level: 7 ... 9 mA.

no →

1. No operation or incorrect operation:
Control unit defective.
Take out and replace control unit.

2. Average value only is incorrect:
Adjust average value by adjustment of the idle-mixture-adjusting screw in the mixture-control unit.

Turning counter-clockwise: current increases.

Turning clockwise: current drops.

yes ↓

Cotinued on G13/G14

Test 24:

Lambda closed-loop control-rich stop

Switch settings:

V	Ω	Button
14	22	-

Turn on ignition.

Current increases to: max. 16 mA.

no → No reading, or no change in current:
Control unit defective.

Take out and replace control unit.

yes

Test 25:

Lambda closed-loop control-lean stop

Switch settings:

V	Ω	Button
14	23	-

Turn on ignition.

Current drops to: less than 5 mA.

no → No change in current:
Control unit defective.

Take out and replace control unit.

yes

Continued on G15/G16

Test 26/1:

Idle speed control

Control unit connected.

Switch settings:

V	Ω	Button
10	-	-

Test using lambda closed-loop tester KDJE-P 600. Connection: connect the large clips (red - pos., black - ground) directly to the vehicle battery. Blue test lead to the red "V" socket or the test well.
Press button "IR" on the tester.

Have engine at normal operating temperature and operate it at idle speed.

Idle speed (set by control): 720 ± 50 min^{-1}.
With on/off ratio: 28 ± 1 %.

yes

Continued on G17/G18

no

1. Motor hunts, on/off ratio fluctuates:

Idle actuator is not moving freely. Take out and replace it.

2. Idle speed too high, on/off ratio 25% or less:

Idle actuator is sticking. Take out and replace it.

3. Idle speed too low, on/off ratio greater than 90%:

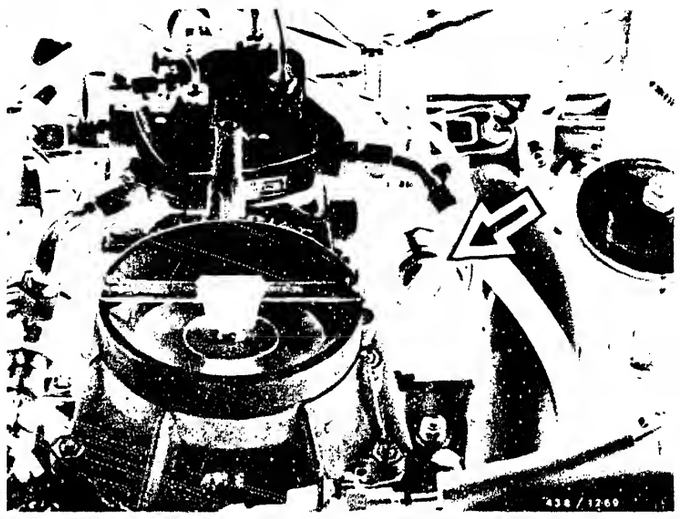
Idle actuator is sticking. Take it out and replace it.

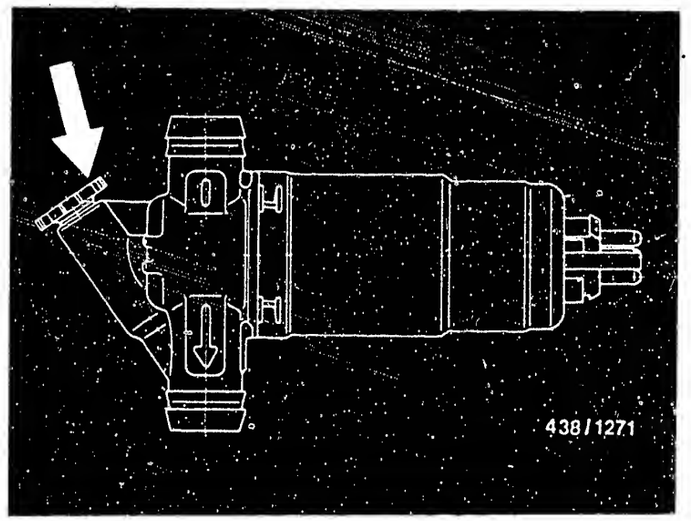
4. Idle speed incorrect, no reading for on/off ratio:

Control unit defective. Take it out and replace it.

5. Idle speed OK, on/off ratio incorrect:

Adjust the on/off ratio by adjusting the bypass screw (arrow) on the idle actuator.
Clockwise: higher on/off ratio
Counter-clockwise: lower on/off ratio





Test 26/2:

Idle speed control - "open-loop" correction function

Operate "idle" throttle valve switch by hand.
On/off ratio: 33 ± 1%.

no → Control unit defective. Take it out and replace it.

yes

Test 26/3:

Idle speed control - air conditioner correction function

Turn on the air conditioner:
On/off ratio: 33 ± 1%.

no → Control unit defective. Take it out and replace it.

yes

Test 26/4:

Idle speed control - "drive mode" correction function (vehicles with automatic transmissions)

Put into drive:

Drop in speed: 100 min^{-1} (620 ± 50 min^{-1})

no →

1. Drive mode selector switch (blockage of start) defective.

Test by operating starting motor. It must be impossible to start with the vehicle in drive.
Take out and replace a defective drive mode selector switch.

2. Lead 16 has a break:

Check lead 16 from the multiple plug to the ignition/starting motor switch, terminal 50 for a break. Eliminate the break.

3. Control unit defective.

Take out and replace control unit.

yes

Testing completed

18. Idle adjustment

18.1 General instructions:

In the Daimler-Benz model 190 E, 2.3 US, idle control is accomplished automatically by means of the added systems for lambda closed-loop (mixture) control, and idle speed control (idle speed). As a result, the method using adjustment of CO and of engine speed normally used otherwise is not used here. On the other hand, it is necessary to check that these two systems are operating at the prescribed operating point for their prescribed operating range. If need be, these operating points are to be adjusted.

Universal test adapter ETT 018.01 - 0 684 101 801, test lead 1 684 463 135, and lambda closed-loop tester KDHE-P 600 are used for testing and adjustment.

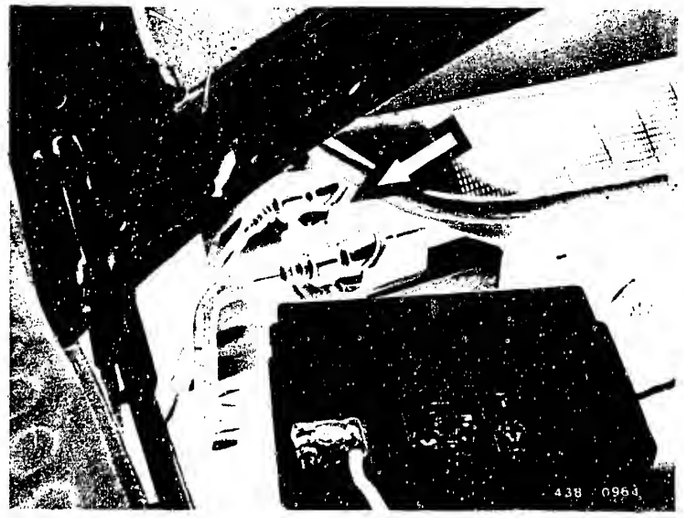
The lambda closed-loop tester is used to measure the intergrator voltage of the lambda closed-loop control and to measure the on/off ratios of the idle speed control.

18.2 Connection of the universal test adapter

Note:

For vehicles with ABS, remove the ABS control unit before taking out the KE-control unit. (Open the clamper and take the control unit out of the mounting with the multiple plug attached).

Shove the KE-control unit (arrow) upward in the mounting and remove it.



1 = Universal test adapter
2 = System-adapter lead
3 = Control unit
4 = System-wiring harness
5 = Pin terminal

Remove the multiple plug on the control unit. (Push back the plug detent and hinge the plug up on the detent side first). Connect the plug to the edge connector of the test lead on the universal test adapter.

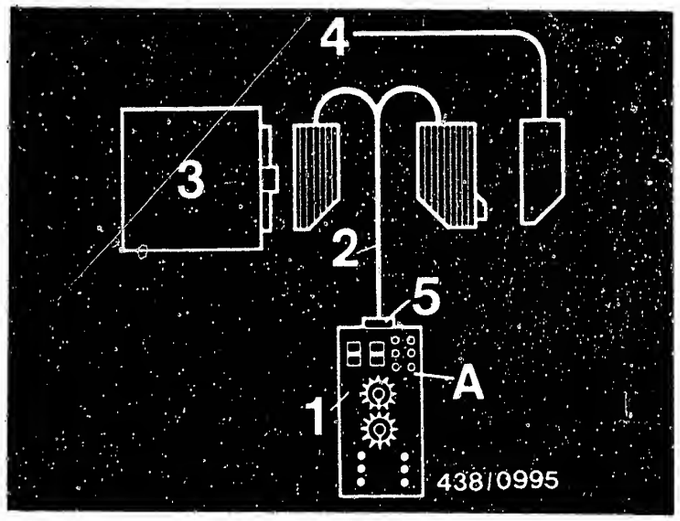
Connect the multiple plug to the test lead on the control unit.

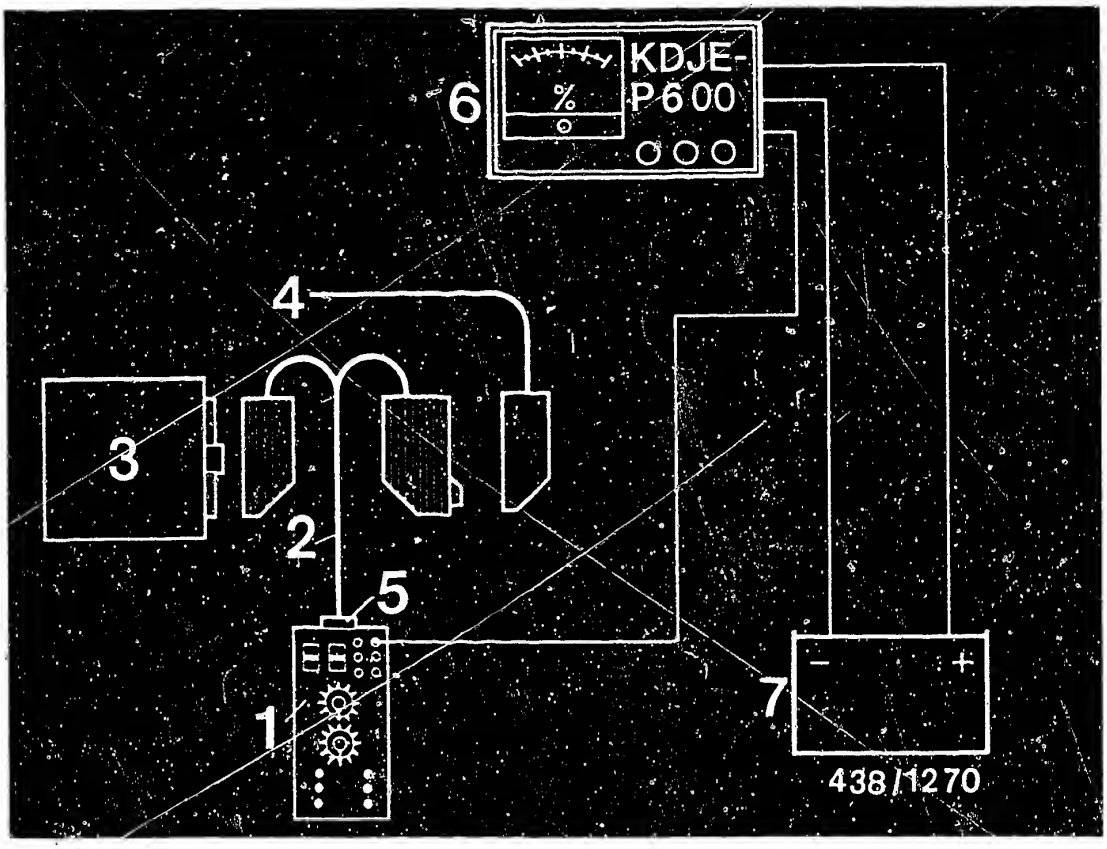
Connect test lead to the universal test adapter across the pin terminal.

Bridge the two black connection sockets 1 and 2 (A) on the test adapter.

Swtich settings on the universal test adapter.

V	Ω	Button
14	24	-





1 = Universal test adapter
2 = System-adapter lead
3 = Control unit
4 = System wiring-harness
5 = Pin terminal
6 = Lambda closed-loop tester
7 = Vehicle battery

18.3 Connection of the lambda closed-loop tester KDJE-P 600:

Connect red clip (pos.) and black clip (neg.) directly to the vehicle battery. Connect the blue test lead to the red "V" socket or to the red test well.

18.4 Procedure for testing and adjustment:

- Intergrator voltage (corresponds to idle-mixture-adjustment):

Test specification: checking value: 2.1 ... 4.8 V
setting value: 2.2 ... 3.8 V

Press button "12 V" on the lambda closed-loop tester. Warm-up the engine and operate it at idle speed.

Take apart the lambda sensor lead at the plug connector (under the carperting in front of the front passenger's seat). The control unit shifts from "closed-loop" to "open-loop" control. The control value must be at about 3 V.

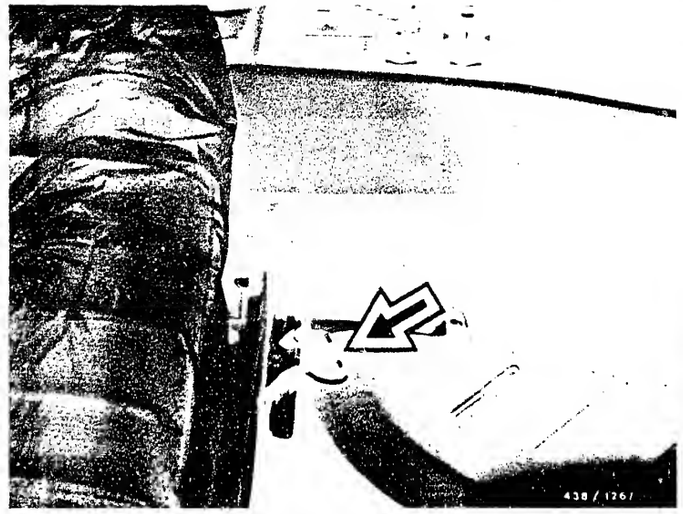
Reconnect the lambda sensor lead. Closed-loop operation of the control unit can be identified by the pulsing reading shown for voltage. This must not exceed or drop below the limits 2.1 ... 4.8 V.

Any correction that may be necessary is made by adjusting the idle -mixture-adjusting screw in the air-flow sensor.

Turning clockwise: lower voltage
Turning counter-clockwise: higher voltage

Make the adjustment in such a way that the average value for the pulsing is approx. 3 V and the reading does not exceed or drop below the setting value 2.2 ... 3.8 V.

If no closed-loop control operation takes place, or if it is impossible to set the values as prescribed, perform the following tests:



Test 1:

Lambda closed-loop control operation
Control unit connected.

Switch settings:

V	Ω	Button
14	24	-

Start the engine and warm it up.

Test specification:

Closed-loop control operation: pulsing reading for voltage. Average value: approx. 3 V

yes

Continued on H5/H6

no

1. No reading for voltage:

Control unit defective. Take out and replace the control unit (arrow, top diagram).

2. Reading for voltage does not pulse but is steady at approx. 3 V:

2.1 Take apart the lambda sensor lead at the plug connector under the carpeting in front of the front passenger's seat (center diagram) and ground the lead on the control unit side. Reading for voltage increases.

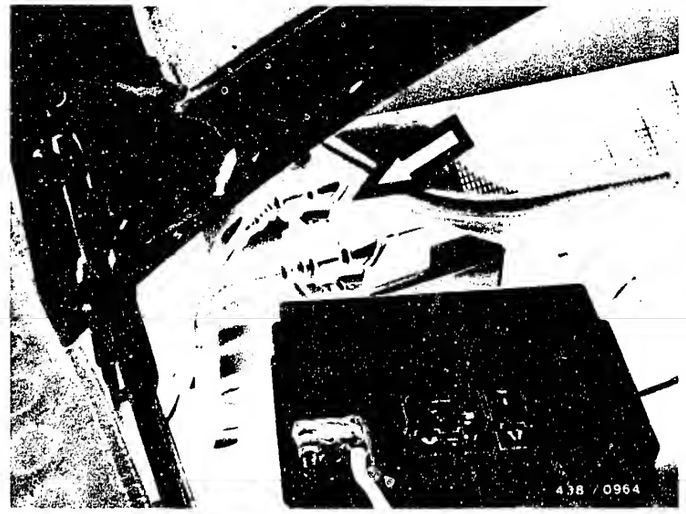
If there is no reaction, the problem may be one of the following:

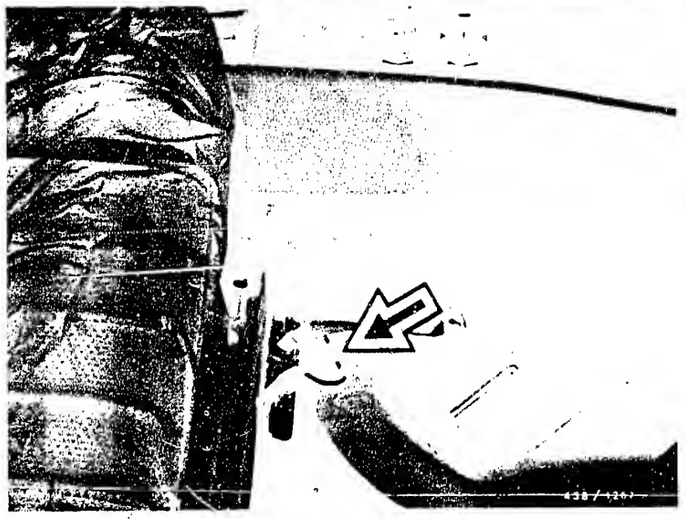
Break in sensor lead to connection 8 on the multiple plug. Eliminate the break.
Control unit defective. Take out and replace the control unit.

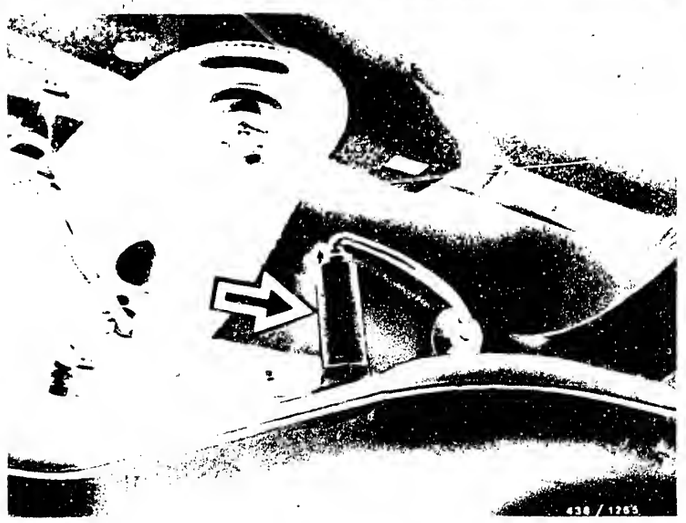
2.2 If the voltage rises when the sensor lead is shorted to ground:

The lambda sensor is defective (arrow, bottom diagram). Take out and replace the lambda sensor.

Before putting in a new sensor, brush its thread with special mounting paste VS 14 016 Ft (5 964 080 105). Brush only threads. It is not permissible for any paste to get into the slots.







Test 2:

Lambda closed-loop control - rich stop

Switch settings:

V	Ω	Button
14	22	-

Turn on the ignition.

Reading for current rises to: greater than 4.8 V.

no

No reading or no change in voltage:

Control unit defective.

Take out and replace the control unit.

yes

Test 3:

Lambda closed-loop control - lean stop

Switch settings:

V	Ω	Button
14	23	-

Turn on ignition.

Current drops to: less than 2 V.

no

No change in voltage:

Control unit defective.

Take out and replace the control unit.

Testing completed

- On/off ratio (replaces adjustment of engine speed):

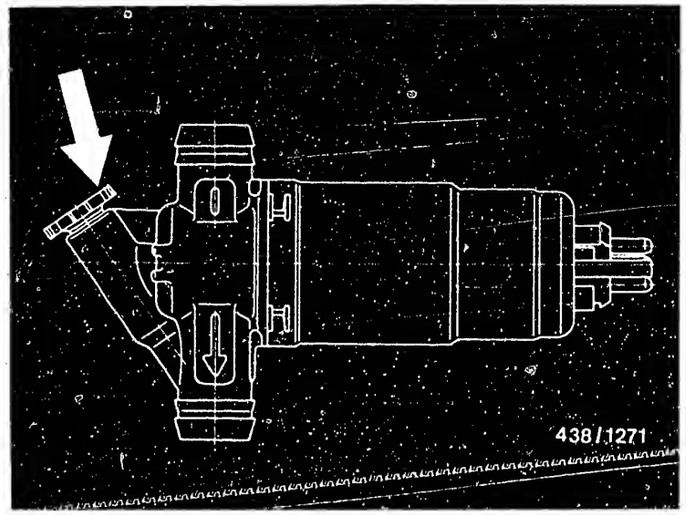
Test specifications: Value set by control: 720 ± 50 min^{-1}
With on/off ratio: 28 ± 1%

Engine speed is automatically regulated to 720 ± 50 min^{-1}, at which speed an on/off ratio of 28 ± 1% must result.

If need be, the on/off ratio is to be adjusted by adjusting the bypass screw on the idle actuator (arrow).

Turning clockwise: higher on/off ratio
Turning counter-clockwise: lower on/off ratio.

If the idle speed is incorrect, unstable, or cannot be adjusted, perform the tests below.



Test 1:

Idle speed control:

Control unit connected.

Switch settings:

V	Ω	Button
10	-	-

Testing with lambda closed-loop tester KDJE-P 600.
Connection: connect the large clips (red - positive, black - ground) directly to the vehicle battery. The blue test lead to the red "V"-socket for the test well.

Press button "IR" on the tester.

Have the engine at normal operating speed and operate it at idle speed.
Idle speed (set by control):
720 + 50 min^{-1}.
With on/off ratio:
28 ± 1%.

yes

Continued on H11/H12

no

1. Motor hunts, on/off ratio fluctuates:

Idle actuator is not moving freely. Take out and replace the idle actuator.

2. Idle speed too high, on/off ratio 25% or less:

Idle actuator is sticking. Take out and replace the idle actuator.

3. Idle speed too low, on/off ratio greater than 90%:

Idle actuator is sticking. Take out and replace the idle actuator.

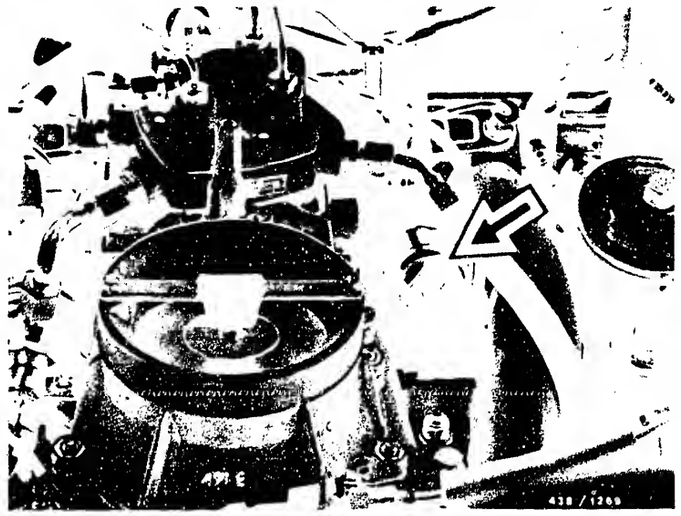
4. Idle speed incorrect, no reading for on/off ratio:

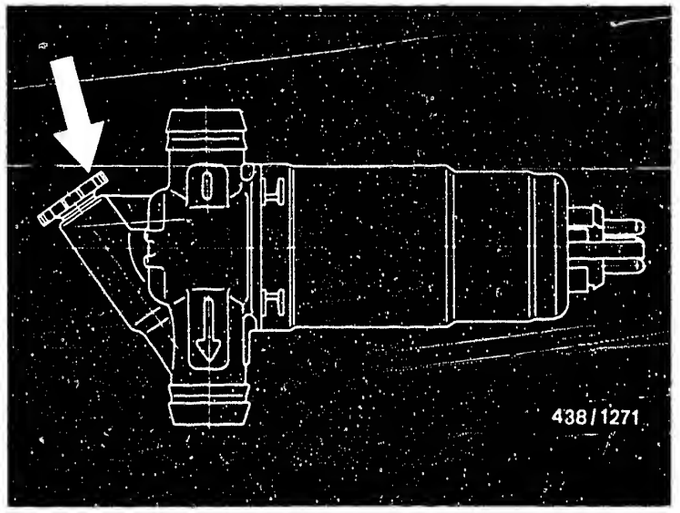
Control unit defective. Take out and replace the control unit.

5. Idle speed OK, on/off ratio incorrect:

Adjust on/off ratio by adjustment of the bypass screw (arrow) on the idle actuator.

Turning clockwise: higher on/off ratio
Turning counter-clockwise: lower on/off ratio.





Test 2:

Idle speed control - "open-loop control" correction function

Operate the "idle" throttle valve switch by hand:
On/off ratio: 33 ± 1%.

no → Control unit defective.

Take out and replace the control unit.

yes

Test 3:

Idle speed control - "air conditioner" correction function

Turn on the air conditioner:

On/off ratio: 33 ± 1%.

no → Control unit defective.

Take out and replace the control unit.

yes

Test 4:

Idle speed control - "drive mode" correction function (vehicles with automatic transmissions)

Put into drive:

Drop in engine speed: 100 min^{-1} (620 ± 50 min^{-1}).

no →

1. Drive mode selector switch (blockage of start) defective.

Test by operating the starting motor. It must not be possible to start with the vehicle in drive.

Take out and replace a defective drive mode selector switch.

2. Break in lead 16.

Check lead 16 from the multiple plug to the ignition/starting switch, terminal 50 for a break. Eliminate any break.

3. Control unit defective.

Take out and replace the control unit.

yes

Testing completed.

After-sales Service

Technical Bulletin

Continuous Injection System mixture control-unit

VDT-I-438/100 B

Ed. 2 7.1975
Translation of German edition of 1.7.1975

The mixture control unit is still being reported as one defective unit in warranty claims. We wish to point out expressly that the mixture control unit consists of two separate products, the air-flow sensor and the fuel distributor, and that there are separate defect numbers for them in the warranty manual. Please report only the defective product.

Accessory Sets

Various fuel distributors and warm-up regulators have been supplied up to now with pressed-in plug connectors. These will no longer be supplied in future.

	no longer available	Replacement + accessory set
Fuel distributor	0 438 100 002	0 438 100 017
	0 438 100 003	0 438 100 005 + 2 437 001 001
	0 438 100 004	0 438 100 017
Warm-up regulator	0 438 140 002	0 438 140 004 + 1 437 000 000

The accessory sets contain the required number of tailpieces and seal rings.

Please note: the accessory set 2 437 001 000 is delivered included with the fuel distributor 0 438 100 017, and does not therefore need to be ordered separately.

Electric Fuel Pump

In the Technische Mitteilung VDT-BMO 114/1 B and the Service Information sheet VDT-I-740/2-1 B 1st. supplement, we announced that the non-return valve can be replaced on the electric fuel pump 0 580 254 996. We have come to the conclusion from the warranty claims that not enough use is being made of this possibility. Please bear this fact in mind and repair leaky electric fuel pumps before deciding to replace the entire assembly.

In case of inquiry, please contact your authorized representative.

ROBERT BOSCH GMBH
Geschäftsbereich KH
Kundendienst - Technik

BOSCH Geschäftsbereich KH, Kundendienst, Kfz-Ausrüstung.

After-sales Service

Technical Bulletin

Packaging of goods under warranty

438

K-Jetronic (CIS)

VDT-I-438/101 B
10. 1976

All components or assemblies of the K-Jetronic which are dispatched under warranty must be correctly and carefully packaged so that no further damage or impairments occur during transit, since these would not be covered by warranty.

Any fuel remnants must be removed from those K-Jetronic assemblies intended for dispatch, so as to eliminate any danger of fire during transit.

The intake openings and outlets of the assemblies must be sealed off with caps or plugs. As new products were fitted, the caps or plugs from these may be used.

The plunger of the fuel distributor is to be fitted with a protective cap of adequate size, or secured to the fuel distributor.

In addition, the assemblies are packed in tightly packed, well-sealed plastic sleeves. Fuel distributors and warm-up regulators are packed individually.

If components arrive damaged due to incorrect packaging or do not comply with these instructions, they can be returned and the warranty claim rejected.

BOSCH Geschäftsbereich KH, Kundendienst, Kfz-Ausrüstung.

After-sales Service

Technical Bulletin

L-JETRONIC and
TCI-h "Hybrid"

VDT-I-280/102 En
7.1980

Please note:

TCI-h trigger boxes in hybrid construction form can not yet be fitted into vehicles with L-Jetronic.

By means of the internal current limiting of the trigger boxes, impulses are created which enter the L-Jetronic control unit from terminal 1 of the ignition coil. Because of these additional impulses more fuel is injected than is necessary.

This means therefore: higher fuel consumption,
out-of-true engine running and
bad acceleration behaviour.

A new TCI-h of the conventional kind (without internal current limiting) with part no. 0 227 100 916 has therefore been delivered for vehicles with a 4 cyl. engine with L-Jetronic.

The supplementary-equipment set 0 227 100 916 is intended at first for the following vehicles:

Opel-Kadett C	GT/E	1.9 l	with ignition distributor 0 231 170 154 ... 235
Opel-Kadett C	GT/E	2.0 l	
Opel-Kadett Rally		2.0 l	
Opel-Manta	GT/E	2.0 l	
Opel-Rekord E		2.0 l	
VW-Beetle Automatic		1.6 l	with ignition distributor 0 231 170 044 ... 046 ... 048 ... 093

BOSCH Geschäftsbereich KH, Kundendienst, Kfz-Ausrüstung.

After-sales Service

Technical Bulletin

EXCHANGEABLE NON-RETURN VALVES
in electric fuel pumps 0 580 254 ..

VDT-I-438/104 En
3.1983
(Replaces Ed. 5.1982)

Electric fuel pump	Parts set (non-return valve + seal ring)	Non-return valve	Seal
0 580 254 001	1 587 010 500	---	---
002	500	---	---
0 580 254 003	502	---	---
004	502	---	---
005	502	---	---
006	502	---	---
007	500	---	---
948	005	---	---
949	002	---	---
950	006	---	---
951	006	---	---
952	002	---	---
953	501	---	---
954	002	---	---
956	002	---	---
957	002	---	---
958	002	---	---
959	002	---	---
960	002	---	---
961	002	---	---
962	002	---	---
963	005	---	---

Electric fuel pump	Parts set (non-return valve + seal ring)	Non-return valve	Seal ring
0 580 254 964	1 587 010 002	---	---
965	002	---	---
966	002	---	---
967	002	---	---
968	002	---	---
969	002	---	---
970	002	---	---
971	002	---	---
972	002	---	---
973	002	---	---
974	002	---	---
975	003 ④	---	---
976	004 ③	---	---
977	004 ③	---	---
978	1 587 410 901	---	---
979	010 004 ③	---	---
980	002	---	---
981	002	---	---
982 ①	003 ④	---	---
982 ②	1 587 410 901	---	---
984	010 004 ③	---	---
985	---	1 583 385 006	1 580 203 002
986	---	386 011	001
987	---	008	001
988	---	008	001
989	---	008	001
990	---	385 004	002
991	---	004	002
992	1 587 010 001	---	---
996	---	386 011	001
998	---	385 004	002
9 580 234 003	002	---	---
005	002	---	---

1 = up to FD 822 2 = from FD 823

3 = Parts set ..003 also possible (delivery-line connection at 90°)

4 = Parts set ..004 also possible (delivery-line connection axial)

After-sales Service

Technical Bulletin

KE-JETRONIC

After-sales service procedure

VDT-I-438/109 En

10.1982

Brief description of the system

The KE-Jetronic is a continuously operating gasoline injection system which is electronically controlled.
The difference from K-Jetronic: the warm-up control and additional control functions (e.g. voltage increase for starting and overrun fuel-cutoff) are taken over by an electrohydraulic pressure-correcting element which replaces the warm-up regulator. The pressure-correcting element is fitted directly onto the fuel distributor.

Users

Mercedes-Benz as the first vehicle manufacturer to offer KE-Jetronic, has fitted it to the 190 E (type W 201, starting 10.1982).

Components

Air-flow sensor	0 438 121 001	Fuel filter	0 450 905 406
Fuel distributor	0 438 101 001	Fuel accumulator	0 438 170 038
Pressure-correcting element	2 437 020 003	Start valves	0 280 170 412
Auxiliary-air device	0 280 140 161	Pressure regulator	0 438 161 001
Injection valves	0 437 502 010	Temperature sensor	0 280 130 031
Electric fuel pump	0 580 254 950	Control unit	0 280 800 100

The part numbers are also listed on the vehicle equipment microfiche AA .. .

Service/exchange parts

The air-flow sensor can be partly repaired (for scope of replacement see microfiche EE .., under 0 438 121 ..).
The fuel distributor and the control unit are also available as exchange items (see exchange microfiche WB .. and exchange price list PD 02).

After-sales Service

Motor Vehicle Service Information

LIQUID PETROLEUM GAS (AUTOGAS) SYSTEMS AND VEHICLES WITH K-JETRONIC

VDT-I-Gen. 052 En
10.1982

Fitting at a later stage

Vehicles with K or L-Jetronic are not suitable for fitting at a later stage with liquid petroleum gas (LPG) systems.

Numerous problems can occur, such as:

- Reduction of fuel flow through the injection valves due to deposits
- Stiffness or blocking of the K-Jetronic fuel distributor plunger (due to gumming or similar) in the course of time with "gas only operation."
- Increased danger of backfiring in the intake manifold (burbling) and thereby damage to the air-flow sensor.

Guarantee

Guarantee claims for failed Jetronic components from vehicles thus converted will not be accepted.

Conversion to liquid gas operation is made at the risk of the vehicle owner.

BOSCH Geschäftsbereich KH, Kundendienst, Kfz-Ausrüstung.

Testing concept

The testing of the system in the vehicle is carried out not only with the test apparatus used for K-Jetronic, but also with the universal test adapter in conjunction with a special system adapter cable as well as a commercially available multimeter.

Universal test adapter ETT 018.01, part no. 0 684 101 801
System cable part no. 1 684 463 .. (in preparation)
Supplied by Division K7 (Test Equipment).

Technical documentation

Technical Bulletin "New Product" VDT-I-438/3.
Trouble-shooting instructions and test specifications: SIS microfiche MB .. (in preparation).

Training

Technical training for this system is integrated into the courses on K-Jetronic and Jetronic special.

Retrofitting

This system is not intended for retrofitting.

Guarantee procedure

a) Federal Republic of Germany
Components on which a claim is to be made should be sent for inspection during the guarantee period via the relevant Bosch wholesaler to:

K5/QSG
Wareneingang
Am Boschwerk
7000 Stuttgart 30

with guarantee claim form G 20 and delivery slip KH/VKD3 - 15333

b) Other countries
Components on which a claim is to be made should be sent for inspection during the guarantee period to the appropriate representative in your country.

After-sales Service

Motor Vehicle Service Information

UNIVERSAL TEST ADAPTER

VDT-I-Gen. 1001 En
1.1982

1. Application

The multiplicity of different fuel-injection and ignition systems at present available on the market, as well as the advances in development which can be expected in the future, demand a new testing concept. In order to maintain the outlay for test equipment, and hence the costs, at a reasonable limit we have developed the universal test adapter.

The following systems can be tested using a test-adapter universal unit together with adapter leads suited to the system in question:

1.1 Systems which are already being fitted as series:

- L-Jetronic (1st generation)
- LE-Jetronic (2nd-generation L-Jetronic)
- Motronic (with the new connector designation, refer to the vehicle-specific instructions!)

1.2 Systems whose introduction is planned:

- Motronic with gearbox control
- KE-Jetronic
- Mono-Jetronic
- Electronic ignition system with ignition map (EZF)

2. Delivery dates and Part Numbers

Available as from 2.1982.

2.1 Universal test adapter (basic unit)

Part Number: 0 684 101 801

Designation: ETT 018.01

2.2 System adapter lead for LE-Jetronic (2nd-generation L-Jetronic)

Part Number 1 684 463 123

First application: For BMW 2.5/2.8 l engines as from 9.1981, and for Opel 2.0 l engines (Manta/Rekord) as from 9.1981.

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2.3 System adapter lead for Motronic with new connector assignment.

(Refer to the vehicle-related instructions!)

Part Number : 1 684 463 124
First application: Porsche 944 as from series production, BMW as from about 3.1982 (Europe)

2.4 System adapter lead for L-Jetronic (in preparation)

Further system adapter leads will be made available along with the introduction of the new systems as mentioned above.

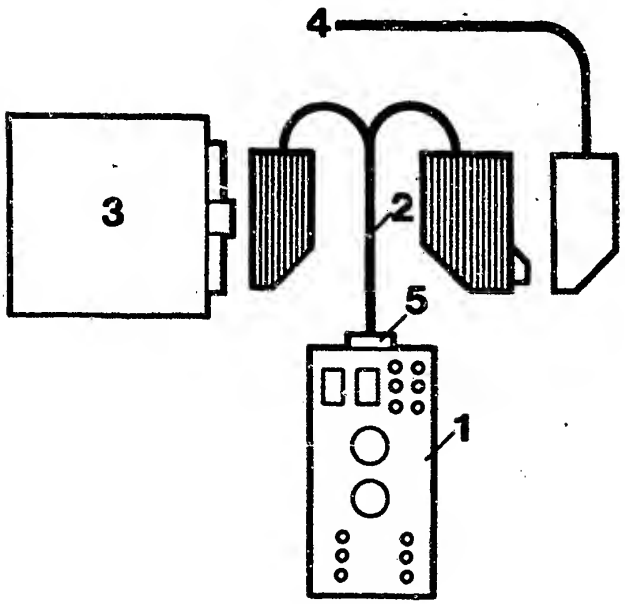
3. Testing procedure

The systems and the components are tested for voltage and resistance values as well as for correct functioning. Evaluation is by means of a multimeter and the Motortester which are connected into the universal test adapter.

Depending upon the complexity of the system, interchangeable adapter lead model 1 or model 2 is provided:

3.1 Adapter lead for peripheral and function testing (Model 1)

The universal test adapter together with the system adapter lead is to be connected to the system wiring harness and to the control unit (e.g. Motronic).
To be tested: Wiring harness with components and control unit.

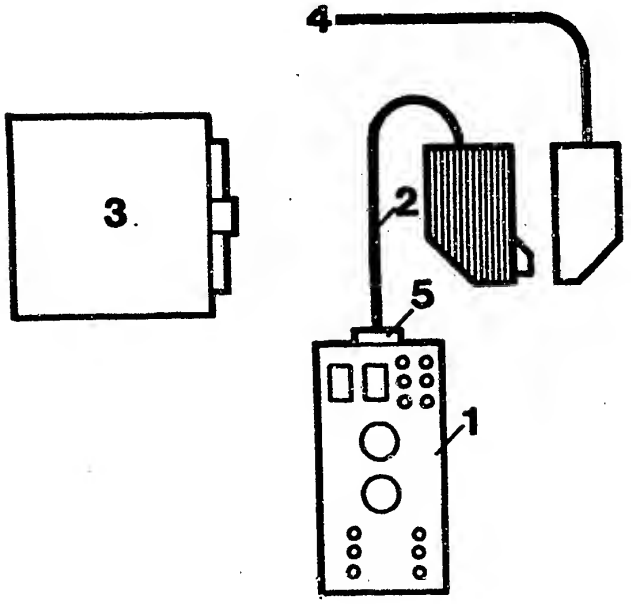


1 = Universal test adapter (basic unit)
2 = System adapter lead (Y-version)
3 = Control unit
4 = System wiring harness
5 = Plug connection

3.2 Adapter lead for peripheral testing (Model 2)

The universal test adapter with system adapter lead, is only to be connected to the system wiring harness (e.g. LE-Jetronic (2nd-generation L-Jetronic)).

To be tested: Wiring harness with components (without control unit).

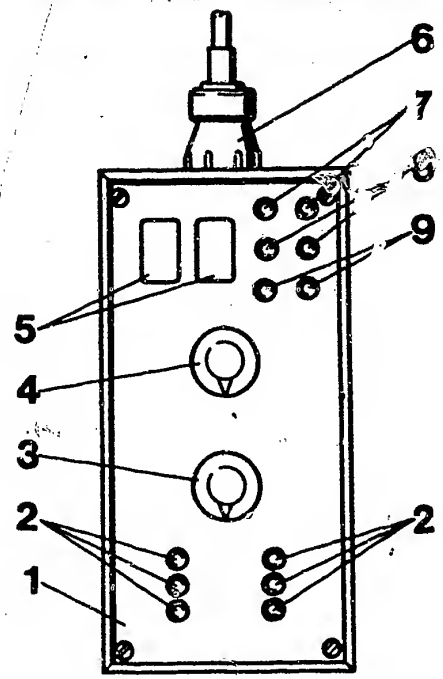


1 = Universal test adapter (basic unit)
2 = System adapter lead
3 = Control unit (not connected)
4 = System wiring harness
5 = Plug connection

4. Construction of the universal test adapters

The universal test adapter is fitted with 2 program switches footage and resistance measurement. The measured values are displayed on the multimeter connected to the universal test adapter. For reasons of safety, the voltage and resistance sockets are separated. In order to measure signals (e.g. injection pulses, ignition pulses), it is necessary to connect a Motortester to the measuring cavities (special input).

When carrying out functional tests with the control unit connected, selected push-buttons are pressed in a number of test-program steps in order to simulate a variety of different engine operating conditions the influence of which is evaluated using the Motortester.



1 = Universal test adapter (basic unit)

2 = Keyboard for simulation of various conditions e.g. engine temperature, throttle position etc.

3 = Program switch "Ohm" for resistance measurement

4 = Program switch "Volt" for voltage measurement

5 = Measurement "cavities" (for the special input from the Motortester)

6 = 63-pole plug-in connection for connecting the system adapter lead

7 = Measurement sockets (voltage measurement with a multimeter or with the Motortester)

8 = Measurement sockets (resistance measurement with the multimeter)

9 = Sockets for special functions (not yet allocated)

Notes:

1. The Motronic test adapter (0 684 101 800, ETT 018.00) will continue to be used for Motronic-equipped BMW vehicles (with old connector assignment) up to about year of manufacture 3.1982 (refer to vehicle-specific instructions).

2. Details on the operation of the universal test adapter, and the test specs, are to be found in the vehicle-specific after-sales service instructions.

3. Caution! Change of Part Number:

On the SIS-microfiches OPE-00/022 (Coordinates A14 and A17) the new Part Numbers are as follows:

Universal test adapter: 0 684 101 801

Adapter lead : 1 684 463 123

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Issued by: After-Sales Department, Training and Technology (KH/VSK). Press date: 4.1989

Microfilmed in the Federal Republic of Germany. Micro-photographié en République Fédérale d'Allemagne.